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# Construction Methods

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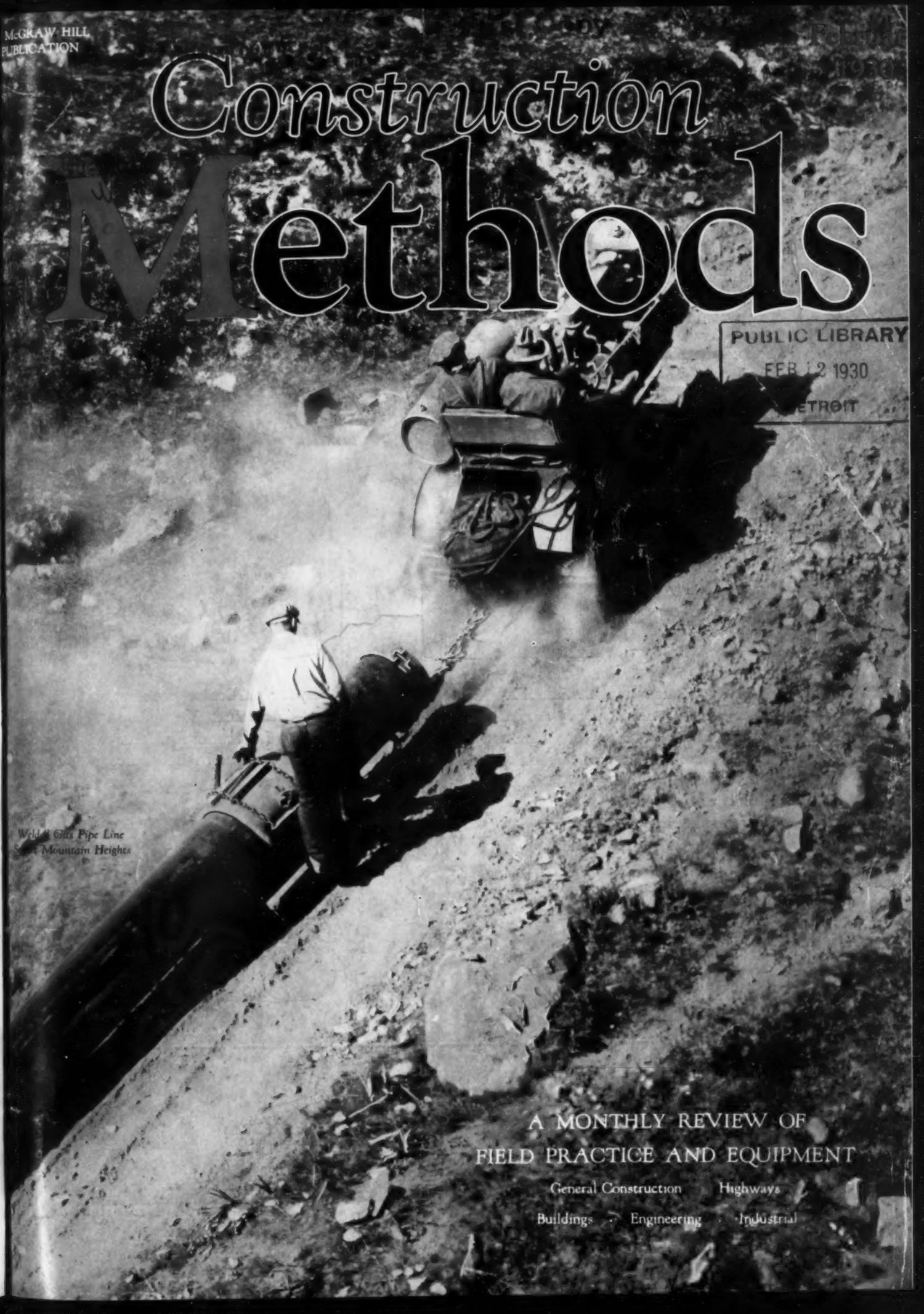

Welded Gas Pipe Line Over Mountain Heights

A MONTHLY REVIEW OF
FIELD PRACTICE AND EQUIPMENT

General Construction · Highways · Buildings · Engineering · Industrial

# The Measure of Wire Rope Quality is the SERVICE it has Rendered

Which wire rope to use on your equipment—which brand will give the longest and most economical service—may be best determined by past records of performance established under similar operating conditions. This and the reputation of the maker are of paramount importance.

For over half a century American Wire Rope, made exclusively by the American Steel & Wire Company, has demonstrated its superiority—proved beyond question that its tough, flexible and abrasion-resistant nature is the best insurance against breakdowns and costly delays.

Regardless of your particular problem, you will find an American Wire Rope exactly adapted to its economical solution. Consult our nearest branch office or distributor to get the right rope for your purpose.

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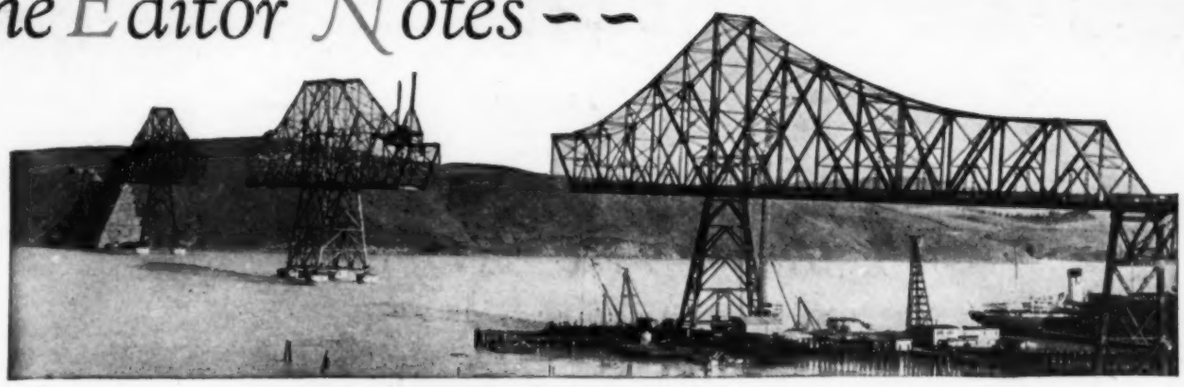
TECHNOLOGY DEPT

# The Editor Notes - -



### *The Road Convention and Show*

THE Road Show has come and gone. Held simultaneously with the annual convention of the American Road Builders' Association at Atlantic City, N. J., last month the occasion was noteworthy in many respects. The newly built Auditorium, largest convention hall in the world, was filled to capacity with attractive and instructive exhibits of construction equipment and materials, grouped on both main and basement floors. The increased floor space available this year did away with the crowding of exhibits and congestion of aisles common at former shows and gave the spectator an opportunity to inspect in comfort the things that interested him. It was a relief, too, to find at Atlantic City ample hotel accommodations for the convention crowd.

The technical program was featured by a vast amount of excellent committee work undertaken and reported on by the city, the county and the contractors' divisions of the association. Pan-American sessions were instrumental in providing for an exchange of knowledge and an opportunity for closer co-operation and mutual understanding among the highway builders of the United States and their Latin-American confreres. Attendance at the engineering sessions, however, was disappointing in spite of a program of unusual excellence. More and more every year it is noticeable that the Road Show has become a counter-attraction that leaves many seats empty while the technical papers and committee reports are being presented at the convention sessions.

* * *

One clear indication of the meetings is that a new field of effort for highway engineer, constructor and equipment manufacturer has been opened up by the large-scale program of airport construction now under way in this country. With the exception of hangars and other buildings, airports involve the same general type of construction and the same kinds of equipment and materials as does road building. With this point definitely established airport authorities will do well to follow the recommendation that they let their work in separate contracts, one for the buildings and other structures, and the other for the grading, drainage and paving operations that lie distinctly within the scope of the road builder's work.

The association ratified the nomination as president, to take office in May, of William A. Van Duzer, assistant chief engineer of the Pennsylvania Highway Department. The action assures for the organization an able and efficient leadership.

Where the 1931 convention and show will be held is still undecided. Judging from the comment of officials the choice may narrow down to Atlantic City, Houston, Texas and New Orleans, with something in favor of the latter two cities because of their location in the South.

**CONSTRUCTION METHODS**
*A monthly review of modern construction practice and equipment*

ROBERT K. TOMLIN, *Editor*

*Editorial Staff*
VINCENT B. SMITH NELLE FITZGERALD
J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, *Publishing Director*

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Tenth Avenue at 36th Street, New York

### *Shopping for Bids*

Contractors have condemned the practice of engineers and awarding bodies in asking for new sets of bids after figures have once been received. They should be equally vigorous, according to the New York State Highway Chapter of the A.G.C., in refusing to consider a new set of quotations from manufacturers after all have had one opportunity to bid on any specific order or volume. The buyer should let it be firmly understood that the first price must be the best price.

### *Now Is the Time to Overhaul Plant*

AS THE first step in securing action on the increased construction program to stabilize business, endorsed by the recent conferences of President Hoover with leaders of American industry, the National Business Survey Conference, under the direction of Julius H. Barnes, has made a concrete suggestion that can well be followed by contractors. Specifically, it is recommended that the next couple of months be devoted to an intensive campaign of overhauling, repairing and reconditioning equipment, so that the physical plant of the construction industry will be in shape to meet the demands upon it when outdoor work gets into its stride in the early spring.

Now, too, is a good time to check over equipment on hand with a view to deciding what units—particularly primary units controlling a series of operations—can profitably be replaced by new or improved models that will increase production and lower costs. For construction men it is important to realize that a machine may be obsolete without actually being worn out. Some pertinent comment on this subject is contained in the concluding installment of the article "When Should Equipment Be Replaced?", on p. 39.

### *Where Winter Construction Saved Money*

Figures showing how winter construction can be employed to save money are offered by the New York Building Congress. The specific case cited is that of a 10-story reinforced concrete building erected at a cost of $700,000 during the cold weather months. By spending the sum of $16,000 for winter protection the building was completed six months sooner than would otherwise have been the case. This not only meant a saving of probably $20,000 in interest on the investment but also an equal sum because of earlier occupancy.

# *Worth the Effort*

THE transformation of construction practice from a craft to a science and from a "game" to a business has not just happened. It has been forced by necessity and shaped by the kind of thinking that inspired the article "When Should Equipment Be Replaced?" of which the concluding installment appears in this issue.

The process has been logical and inevitable. To keep step with American industrial progress, the construction worker must command his share of mechanical power. For it is only through thus increasing the productivity of the individual that we can hope to achieve higher living standards for all.

But such a program calls for more and better machinery with a correspondingly greater plant investment. And this demands, in turn, more scientific and business-like management to insure the greatest feasible return on a large and growing investment.

Of all this we have seen but the beginning. During the next decade we shall see the constructor delving more and more deeply into the science of his calling. He will run down more basic facts as to costs, capacities and equipment life, study the economic relations between these facts and from it all, he will learn so to plant his jobs that he may exact the last cent of return from every dollar invested in equipment. Wise selection of plant, however, does not end the contractor's responsibilities. His attitude throughout the job must be one of critical vigilance to determine when newer and better machines—particularly primary units controlling a series of operations—may *profitably* be substituted for those originally purchased.

In keeping before its readers the trend of current practice *Construction Methods* seeks to contribute what it can to make the construction industry more "plant conscious." And from time to time we shall try, as in the article above noted, to formulate some of the principles developed by thoughtful constructors who are bending their minds to this important problem.

Only through such co-operation between the man on the job and the journal to broadcast his findings can we maintain the progress of our industry as a science and a business. And for the greater prosperity and stability it brings to all, the purpose surely is worth the effort.

Willard Chevalier

*Publishing Director.*

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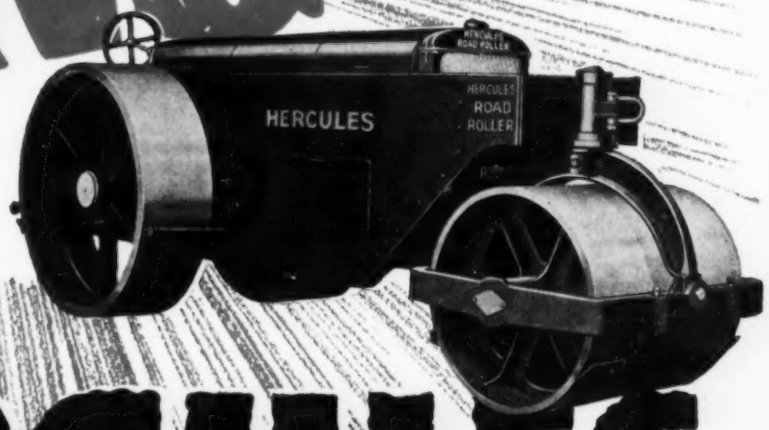


# HERCULES

# 37

of these PERFECT ROAD ROLLERS were purchased at the Atlantic City Road Show—because of their Simplicity, Power, Ruggedness, Flexibility, Dependability and Mobility. It was the sensation of the Show and will continue to be wherever and whenever Road Rollers are used. ¶ The HERCULES represents the experience of leading Highway Engineers, prominent Contractors and others *who know Rollers.* ¶ Powered with an extra large six-cylinder motor, three speeds forward and backward, all gears and clutches housed in a dust-proof case and running in a bath of oil, fitted with ball and roller bearings throughout—there are no bronze bushings or babbitted bearings in this job. ¶ The ALL-STEEL ROLLER—even the wheels are Cast Steel. Built for long, hard, continuous service and minus that grief sometimes found in other Rollers. ¶ Built by OSGOOD—fifty years experience in the manufacture of equipment of this class—five large, well equipped plants and ample resources. ¶ Sold by the leading Contractors Equipment Dealers. You'll see it on all the big jobs this year.

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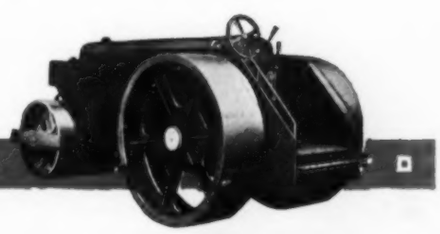


HERCULES "ALL STEEL" ROAD ROLLER

Vanbro's Autocars from Ardmore and Vanbro's Skimmer-Scoops, from the Northwest Engineering Company of Chicago, are here shown in effective combination task of grading the streets of Staten Island.

# South of Liberty

Southward . . past the Statue of Liberty . . to the hills and shores of Staten Island, thousands of New Yorkers homeward wend their way at each day's close. The 60 square miles of Staten Island are dotted with towns full of homes. There are always houses and schools to be built and roads to improve or maintain. There is work without end for precision-built Autocar Trucks.

The Vanbro Construction Company of West New Brighton, S. I. have built bridgeways, highways and streets all over Staten Island. They are partial to Autocars because of the unfailing service that they get from their Autocar fleet of nine in daily use. They are partial to the efficient 6-cylinder Autocar Trail Blazer for the remarkable mobility it possesses due to its short wheelbase. » » » Dependability is the watchword in Autocars, regardless of model. And there are 46 models from which the construction man may choose.

Write for your copy of the Autocar Construction Book. It will tell Who . . How . . Where . . and Why!

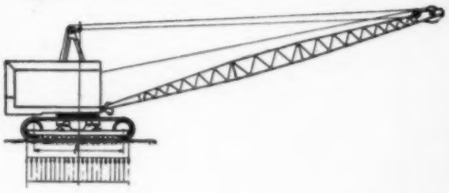
PRECISION BUILT

## AUTOCAR TRUCKS

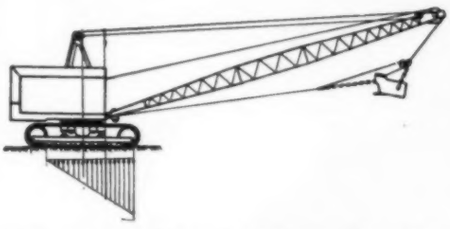
The AUTOCAR Company, Ardmore, Pa., Established 1897

# what is ground bearing pressure?

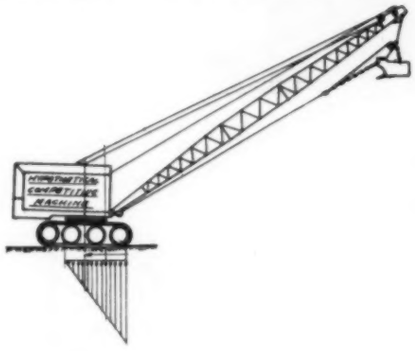
## Can you figure Ground Pressure?



In the usual method of figuring Ground Pressure, the supporting forces are represented by a rectangle under the crawlers as shown above. This condition never exists with a machine loaded anywhere near to capacity, and with a Northwest handling a load of 7400 lbs., would give an erroneous figure of 1356 lbs. to the square foot.



The true condition is illustrated by a triangle as shown above and under these conditions the ground pressure on a Northwest Model 7 is 3060 lbs. per square foot.



A hypothetical competitive machine having the same weight and handling the same load as the Model 7, but equipped with the short crawlers supplied by other manufacturers, would have a ground pressure of 4540 lbs. per square foot.

*Check it for yourself.*

## Low Ground Pressure *takes Northwests where other machines can't travel*

*The usual method of figuring ground pressure by* dividing the weight by the area of the crawlers in contact with the ground is wrong! This weight area ratio is equal to the bearing pressure only under one condition, namely, that the center of gravity of machine and load coincide with the center of gravity of the supporting area of the crawler.

As this cannot possibly be the case with a machine loaded to anywhere near capacity, the resulting figures have no practical meaning whatever.

Consult the diagrams and figures at the left—note that figured correctly, the Northwest Model 7 has a ground bearing pressure 48% less than the average competitive machine using the usual short crawler.

Find out why this is! It means more money for you. Send for Ground Pressure Data!

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1728 Steger Building 28 E. Jackson Boulevard
Chicago, Ill., U. S. A.

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CM2-Gray

MODEL 7

*Send for this booklet!*

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Gentlemen: I am interested in knowing what *ground pressure* means to me and how to figure it. Please send your booklet.

*Name* _____

*Address* _____

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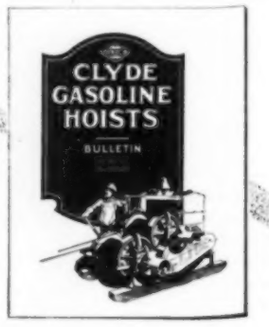
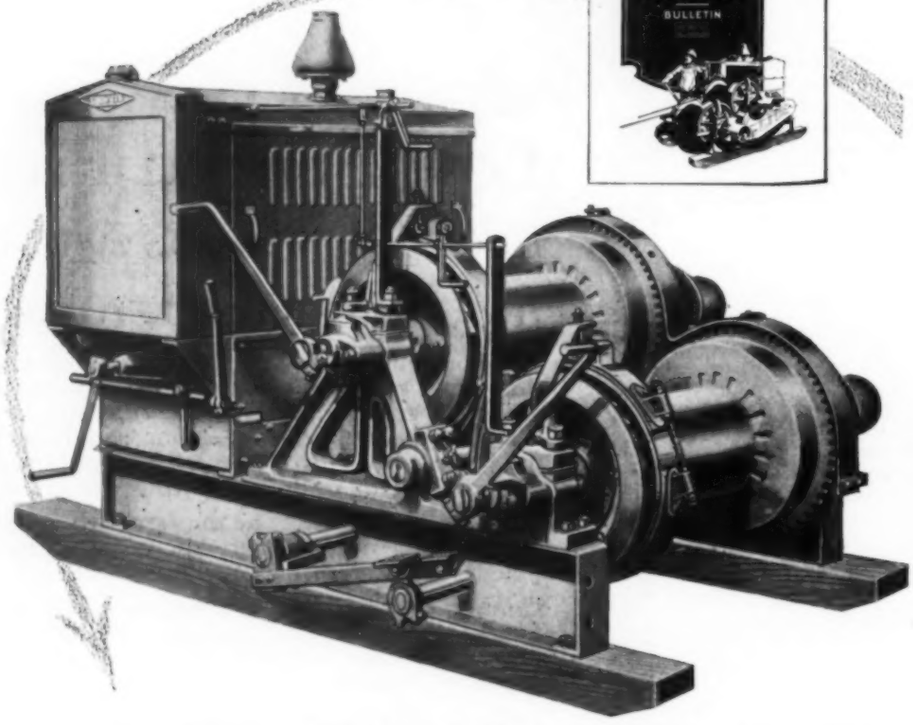
## *Telling you why:-*

Clyde gasoline hoists have won such an enviable reputation.

Leading contractors always endorse them.

Clyde gasoline hoists have the stamina and power to give unexcelled service at all times.



Send for the new Bulletin J4-W which shows construction details of the Clyde gasoline hoists, line pulls and speeds, with other valuable information of particular interest to every contractor.

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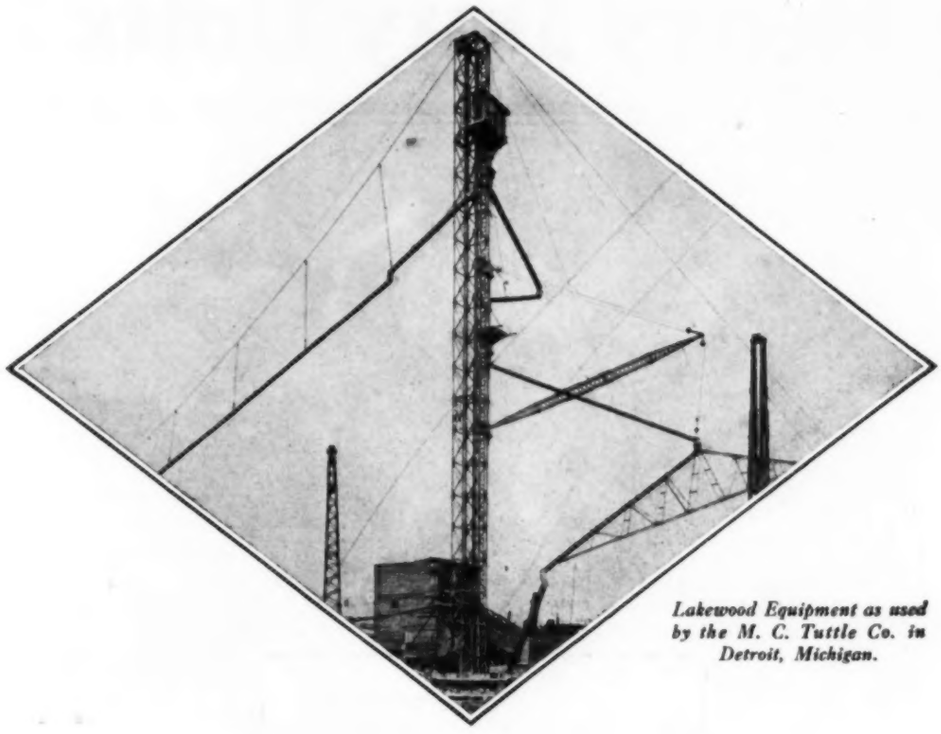

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demonstrates that Lakewood Half-Round Arch-Band Chute *does* handle dry concrete, and larger aggregate concrete, easier.

*Bulletin 23-R tells the whole story*

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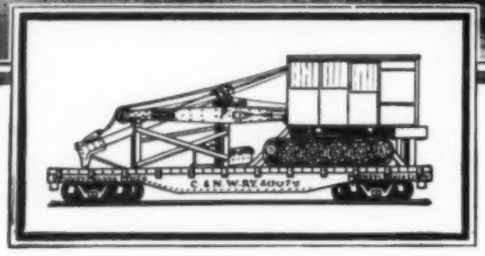

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A Heavy-Duty ¾ yd. size. As a Shovel, it is equipped with a ¾ cu. yd. struck-measure capacity dipper. As a Dragline or Crane, it will handle a ¾ cu. yd. capacity bucket on a 40′ boom. Machine will also handle ¾ cu. yd. bucket as a Trench Hoe.

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Not range or capacity alone, nor power, ruggedness or stability—but an ideal combination of all is represented in the Link-Belt Shovel. Send for catalog No. 1095.

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A Heavy-Duty 2 yd. size. As a Shovel, it is equipped with a 2 cu. yd. struck-measure capacity dipper. As a Dragline or Crane, it will handle a 2 cu. yd. capacity bucket on a 50′ boom. Machine will also handle 2 cu. yd. bucket as a Trench Hoe.

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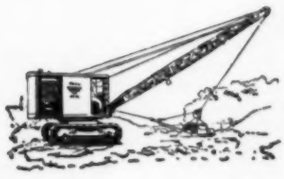
## BEFORE YOU BUY A 1/2 YARD SHOVEL



DO YOU KNOW that you can buy a 1/2-yard gasoline, Diesel or electric shovel, crane or dragline from the world's largest builders of excavating machinery? Built, in every way — materials, workmanship, design — to the same high standards as the big, powerful, rugged quarry and coal stripping shovels. ~ ~ ~ Born of actual field experience with over 10,000 machines operating in all classes of excavation in all parts of the world.

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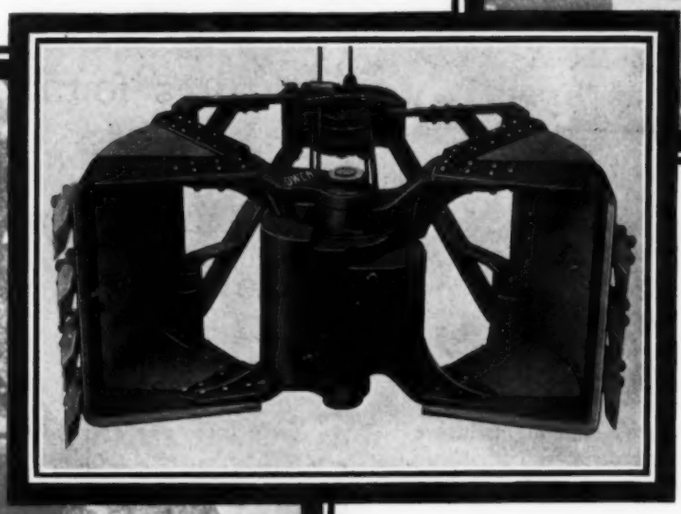

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OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAYS WORK

# Owen Buckets

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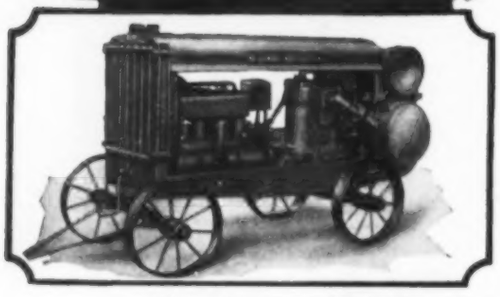

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# WIRE ROPE

## Look to Your Wire Rope

If your operating costs are too high it may be that your equipment is shut down too often for rope replacements.

"HERCULES" (Red-Strand) Wire Rope has proved itself a money saver because its sturdiness enables it to handle a very large tonnage, and its long life makes renewals less frequent. Its uniform durability is a real factor in providing operating economy and in speeding up work.

If you will tell us how you use wire rope, we shall be glad to help you select the correct construction for your particular working conditions.

**Made Only by**

**A. Leschen & Sons Rope Co.**

**[Established 1857]**

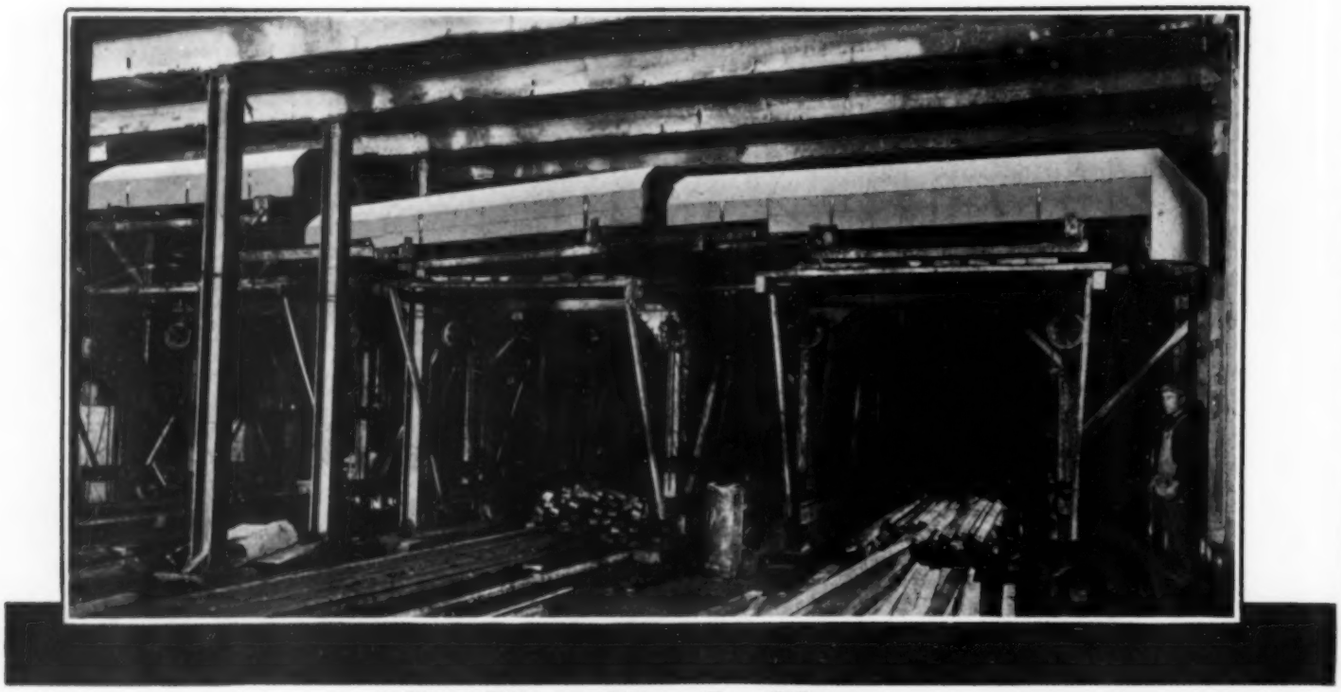
**5909 Kennerly Avenue**

**St. Louis**

**Branches:**

**New York — Chicago — Denver**

**San Francisco**



## *In New York City*

| Contractor | Number of Sections Built |
|---|---|
| Lyons-Slattery Co., Inc. | 1 |
| Marcus Contracting Co. | 1 |
| The Carleton Co., Inc. | 2 |
| Del Balso Construction Co. | 1 |
| Mason & Hanger Co., Inc. | 3 |
| Triest Contracting Co. | 1 |
| J. F. Cogan & Co. | 1 |
| The Arthur A. Johnson Corp. | 2 |
| Mideastern Contracting Corp. | 1 |
| Rodgers & Hagerty, Inc. | 3 |
| Rosoff Subway Construction Co., Inc. | 4 |
| D. C. Serber | 1 |
| Cranford Locher Co. | 2 |
| Flinn-O'Rourke Construction Co. | 4 |
| The Degnon Contracting Co. | 6 |
| Underpinning & Foundation Co. | 1 |
| Thos. A. Bryson | 1 |

| Contractor | Number of Sections Built |
|---|---|
| Bradley Contracting Co. | 4 |
| Carpenter, Boxley & Herrick | 2 |
| Hannon & Hickey | 1 |
| Intercontinental Contracting Co. | 1 |
| Cranford Co. | 2 |
| Dock Contracting Co. | 2 |
| Newman & Carey | 1 |
| Oakdale Contracting Co., Inc. | 6 |
| Rosenthal Engineering Contracting Co., Inc. | 1 |
| Rice & Ganney | 1 |
| Atwell, Gustin & Morris | 4 |
| Patrick McGovern, Inc. | 6 |
| Booth & Flinn Co. | 2 |
| Heyman & Goodman Co. | 2 |
| Moranti & Raymond Inc. | 3 |
| Hart & Early | 1 |
| Slattery-Daino Co., Inc. | 2 |

# —it pays to deal with Blaw-Knox

# Subway Builders
## *depend upon*
# BLAW-KNOX
## *for*
# STEEL FORMS

| Contractor | Number of Sections Built |
|---|---|
| LaRocco Construction Corp. | 1 |
| Clemente Contracting Co., Inc. | 1 |
| T. A. Gillespie Co. | 2 |
| Corson Construction Corp. | 4 |
| Triest Contracting Corp. | 2 |
| Oscar Daniels | 2 |
| J. F. Stevens | 1 |
| U. S. Realty & Improvement Co. | 3 |
| Rapid Transit Subway Construction Co. | 2 |

### *—in Philadelphia*

| | |
|---|---|
| Patrick McGovern, Inc. | 2 |
| Keystone State Corporation | 4 |
| Heyman & Goodman Co. | 1 |

### *—in Cincinnati*

| | |
|---|---|
| The Fred R. Jones Co. | 1 |
| Hickey Bros. | 1 |

### *—in Boston*

| | |
|---|---|
| C. & R. Construction Co. | 1 |
| T. A. Gillespie Co. | 1 |
| Patrick McGovern, Inc. | 1 |
| Hugh Nawn Construction Co. | 2 |
| Coleman Bros. | 1 |
| J. J. Coughlin | 1 |

## More Than 100 Subway Jobs

—and it is interesting to remark that contractors who once use Blaw-Knox Steel Forms *always come back for more.*

Since 1906—Blaw-Knox STEEL FORMS have contributed immeasurably to the success of concrete construction of every description—large and small—from sewers to walls to bridges, etc.

Men of note in the construction industry know Blaw-Knox Steel Forms *well*—and use them.

You will be under no obligation in asking for Blaw-Knox advice—*engineering service*—on any kind of concrete work.

Put your problems up to Blaw-Knox.

**BLAW-KNOX COMPANY**

**2086 FARMERS BANK BLDG. PITTSBURGH, PA.**

NEW YORK CHICAGO CLEVELAND DETROIT BUFFALO
BIRMINGHAM PHILADELPHIA BALTIMORE BOSTON

*Export Division*

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BLAW-KNOX

# CARNEGIE BEAMS

## *for grade-crossing elimination work*

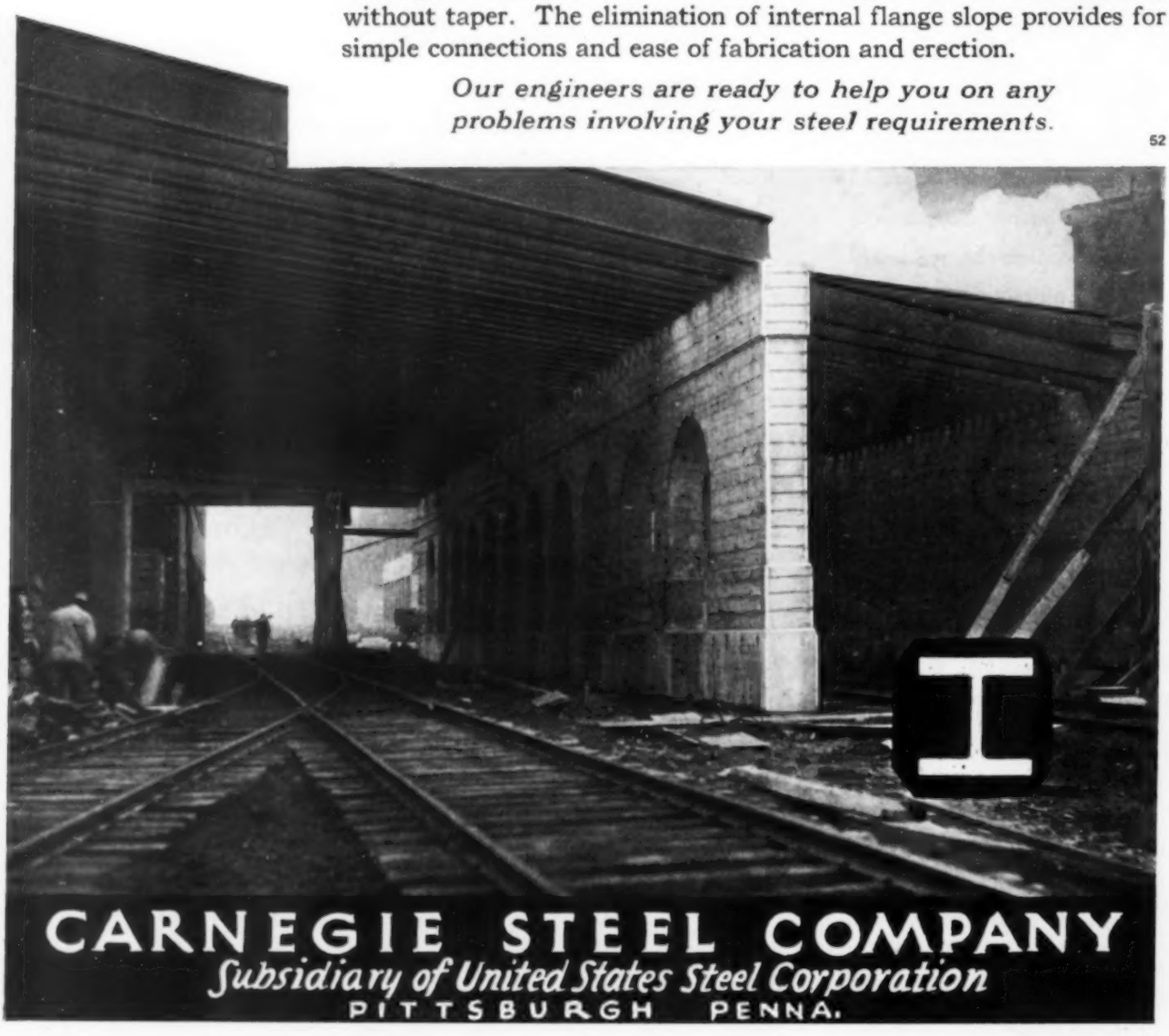
A simple and economical solution of the problems of highway and maintenance of way engineers engaged in grade separation work is offered by Carnegie Beams.

This series of sections comprises a full range of beam, girder and column sections of high efficiency as measured by the ratio of section modulus to the weight. The heavier sections, designed primarily for heavy loads on long spans with the least loss of head room, will prove especially valuable. These sections up to 36 inches deep, offer a wide selection of flange widths and section moduli as high as 1102.7 inches$^3$. They eliminate the fabrication necessary in built-up plate and angle girders.

Carnegie Beams are characterized by flanges of uniform thickness without taper. The elimination of internal flange slope provides for simple connections and ease of fabrication and erection.

*Our engineers are ready to help you on any problems involving your steel requirements.*

52



**CARNEGIE STEEL COMPANY**

*Subsidiary of United States Steel Corporation*

PITTSBURGH PENNA.

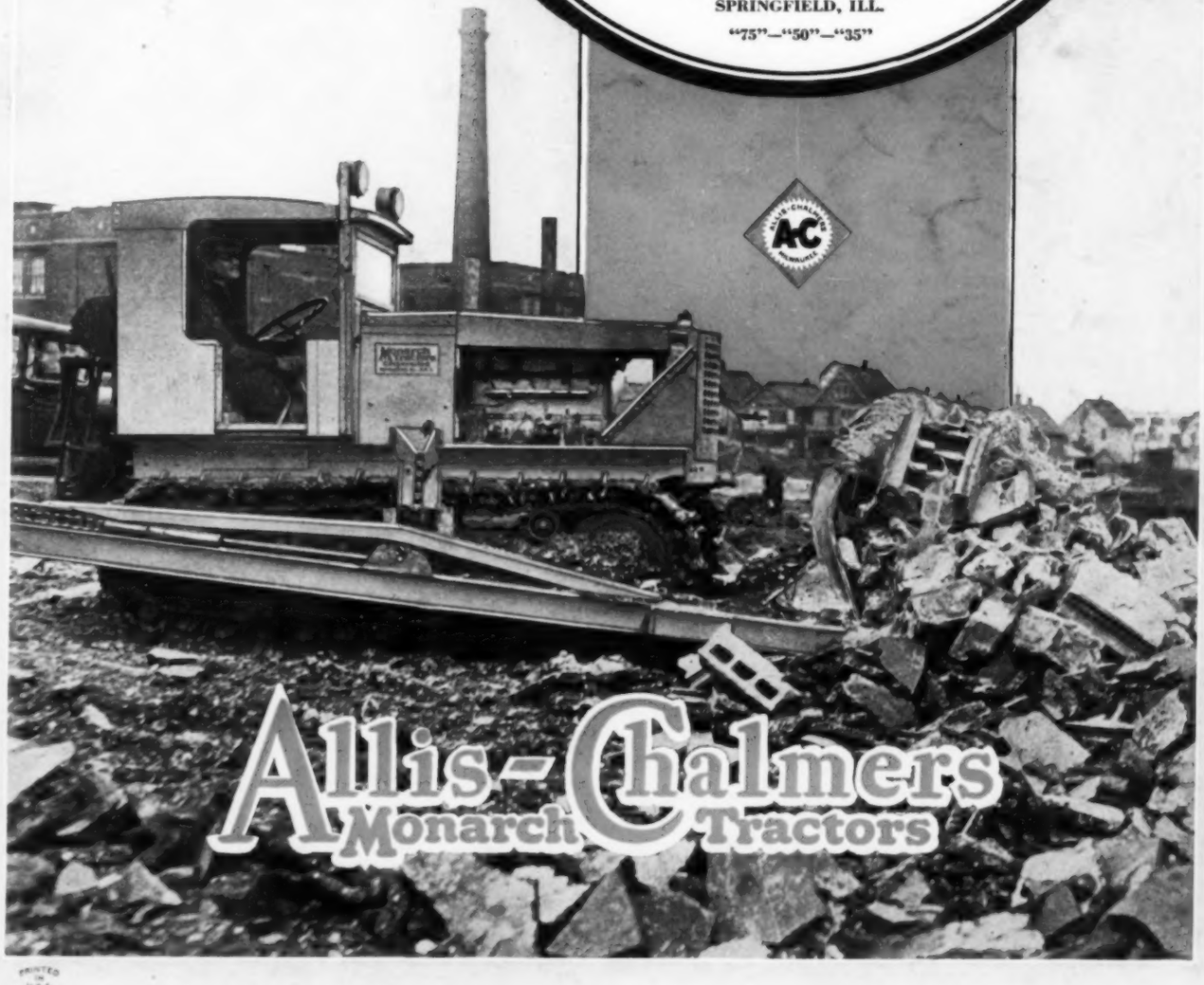
# Equally Useful on Dumping Grounds or Boulevard

The Department of Public Works of Milwaukee, Wis., uses Monarch power to do all kinds of jobs. The illustration shows an Allis-Chalmers Monarch "50", with Baker Bulldozer, spreading material on a fill at one of the city dump heaps. This Monarch is equally useful for hauling loaded wagons, pulling road graders, removing stumps and boulders and doing other work quickly and at low cost.

In Allis-Chalmers Monarch Tractors you have greater traction, due to unusually long tracks . . . You have safe, natural and accurate steering due to combination of clutches and truck-type steering wheel . . . and you have lowest cost drawbar horsepower on the market. Before you buy tractors get prices and full details of Monarchs.

ALLIS-CHALMERS MANUFACTURING CO.
*Specialists in Power Machinery Since 1846*
Monarch Tractors Division
SPRINGFIELD, ILL.

"75"—"50"—"35"

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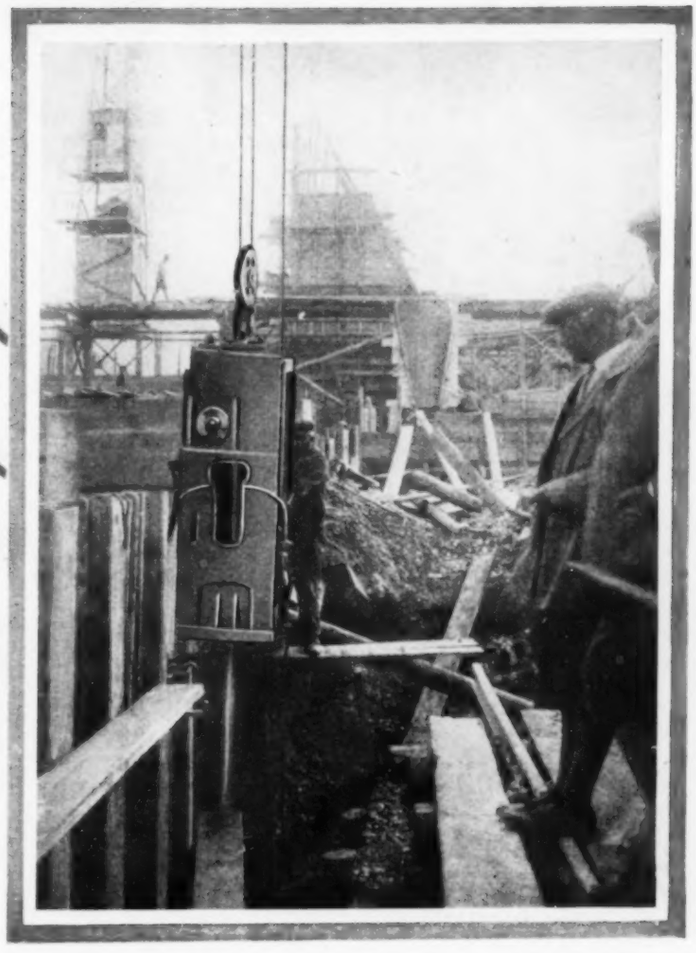
Perfect Balance Makes Monarchs at Ease Under All Conditions
YOU can work on steep grades and side slopes with Monarchs . . . and these perfectly balanced tractors will perform in a way that will surely win your approval. Center of gravity is low, the weight is well ahead on the tracks, and clearance is unusually high. The illustration shows a "50" pulling a power grader on back slope work.
You will find Allis-Chalmers Monarchs easy to work on. All parts are easy to reach and lubrication can be done in quick time. Adjustments are easy to make. Steering by means of clutches and truck-type steering wheel is amazingly easy and accurate.
Throughout Monarch Tractors you will find every feature of advanced design and finest construction. Yet Monarchs offer the lowest cost drawbar horsepower in their class. Let us send you ALL the facts about Allis-Chalmers Monarch Tractors. Drop us a line . . . today.
ALLIS-CHALMERS MFG. CO.
Specialists in Power Machinery
Since 1846
Monarch Tractors Division
SPRINGFIELD, ILL.
"75"—"50"—"35"
Allis-Chalmers
Monarch Tractors
AC

# Here in Germany they—

# DRIVE

## with UNION Hammers



The picture shows a size 2 Union Hammer driving Larssen Steel Sheet Piling in Germany. The hammer is being used without leads.

You can get even penetration with Union Hammers *without damage to the pile tops.*

Special bases can be had for every type of piling.

Union Hammers are made in 10 sizes, for driving and pulling the heaviest piles or the lightest sheeting. Rugged construction ensures long service and lowest possible maintenance.

Consult us about your pile driving requirements.

**UNION IRON WORKS**

*Engineers and Manufacturers*

NEWARK and GROVE STS.,
HOBOKEN, N. J.

Agents in Principal Cities
European Agents—Lidgerwood Limited, Friars House, London

**UNION**
DOUBLE-ACTING
PILE HAMMERS

# Ransome

This plant is being used on a bridge job at Angola, New York.

The Ransome Heavy Type Steel Mast Plant can be used with any one of the three commonly used types of Concrete Chuting Plants—or in combination with two or more of them.

These types are called "The Counterweight Boom Chute Plant"–"The Continuous Line Plant"–the "Bin Plant".

# HEAVY TYPE STEEL MAST PLANT

The Ransome Mast is safely, easily and quickly erected.

Here are some of the important features—Mast sections made in 22½ ft. lengths—easy to handle. On high masts this extra length saves time in erection. The four corner posts are built of 5" 6.7 lb. Channel and 2½" x 2" x 5-16" angle riveted together in a manner that develops maximum strength of section. Tip-over type Bucket.

The Top Sheaves for the Hoist Line are 18" in diameter—equipped with Hyatt Roller Bearings.

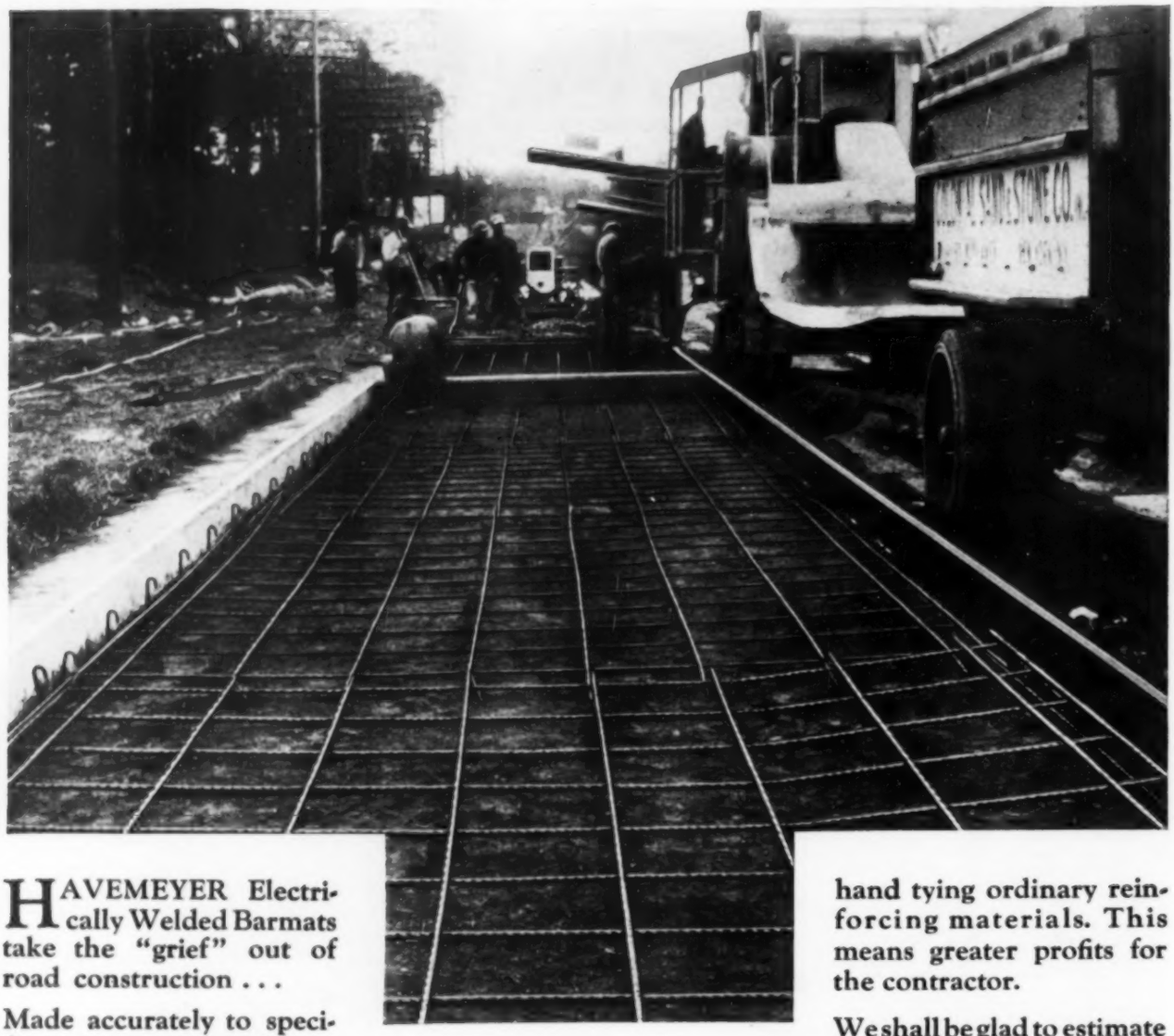
Bulletin 304 tells the complete story—send for your copy today.

**Ransome Concrete Machinery Company**

**1850 — Service for 80 Years — 1930**

**Dunellen** **New Jersey**

# . . . approved by experienced highway engineers!



HAVEMEYER Electrically Welded Barmats take the "grief" out of road construction . . .

Made accurately to specification as to size and spacing of bars and shipped in mats all ready to use—they are easy to lay; certain to fit; and positive in strength, rigidity and permanence of reinforcement.

Best of all, they save the time and labor spent in hand tying ordinary reinforcing materials. This means greater profits for the contractor.

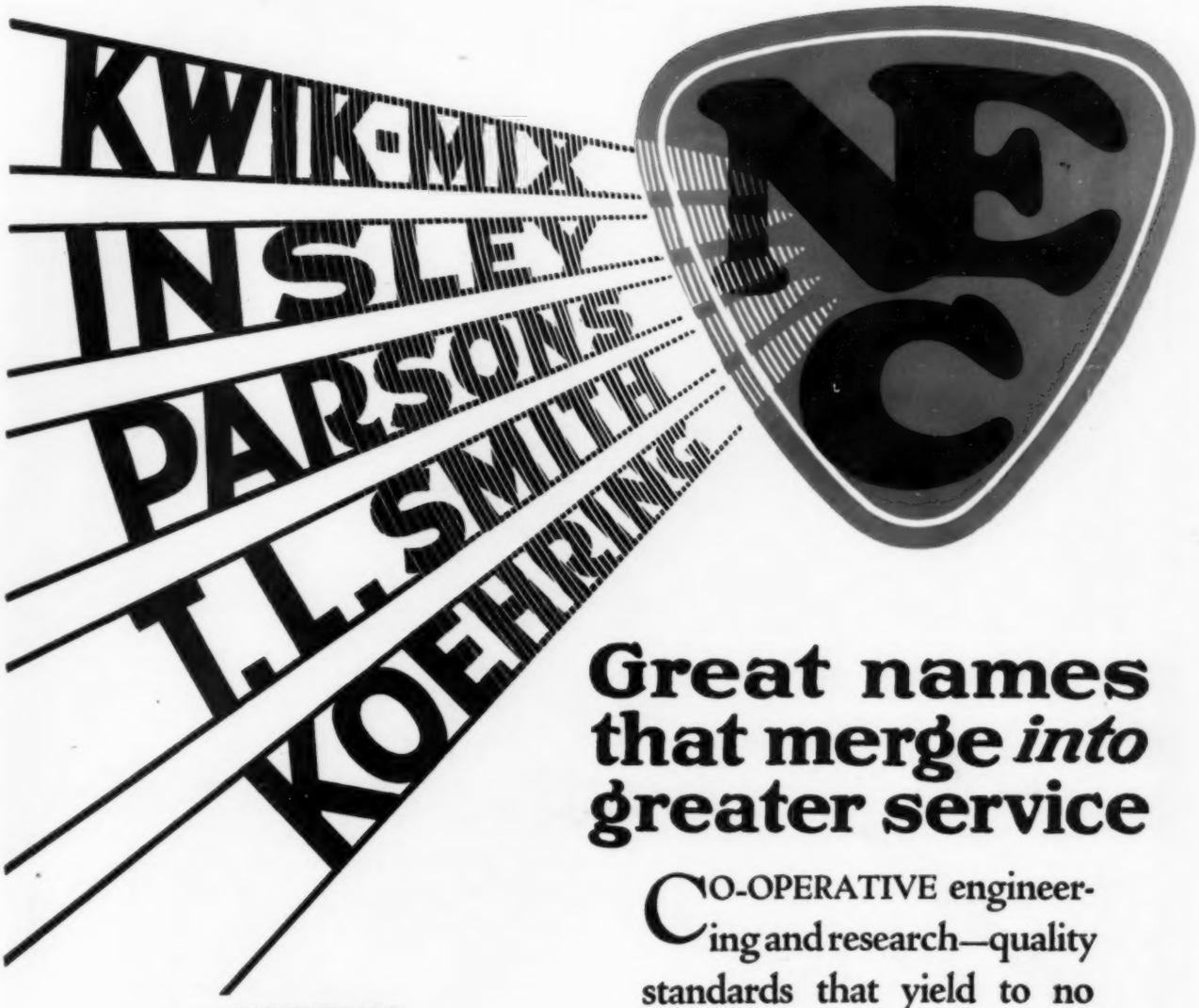
We shall be glad to estimate on Havemeyer Electrically Welded Barmats for your next job. Remember, we also can supply Steel Center Plate, Dowels, Hoosier Asphalt Joint, Wire Mesh, Havemeyer Reinforcing Bars and other specialties. Write!

**HAVEMEYER**
**Electrically Welded**
**BARMATS**

Executive Offices — Concrete Steel Co. — 42 Broadway New York

*Offices in Principal Cities*

# Concrete Steel Co.




# Great names that merge *into* greater service

CO-OPERATIVE engineering and research—quality standards that yield to no sales expediency—a greater field service organization and a stalwart staunchness of policy, protecting contracting as a stabilized, profitable business . . . these are making N. E. C. the greater construction force in the contracting field!

**KOEHRING**
Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.

**INSLEY**
Excavators; Concrete Placing Equipment.

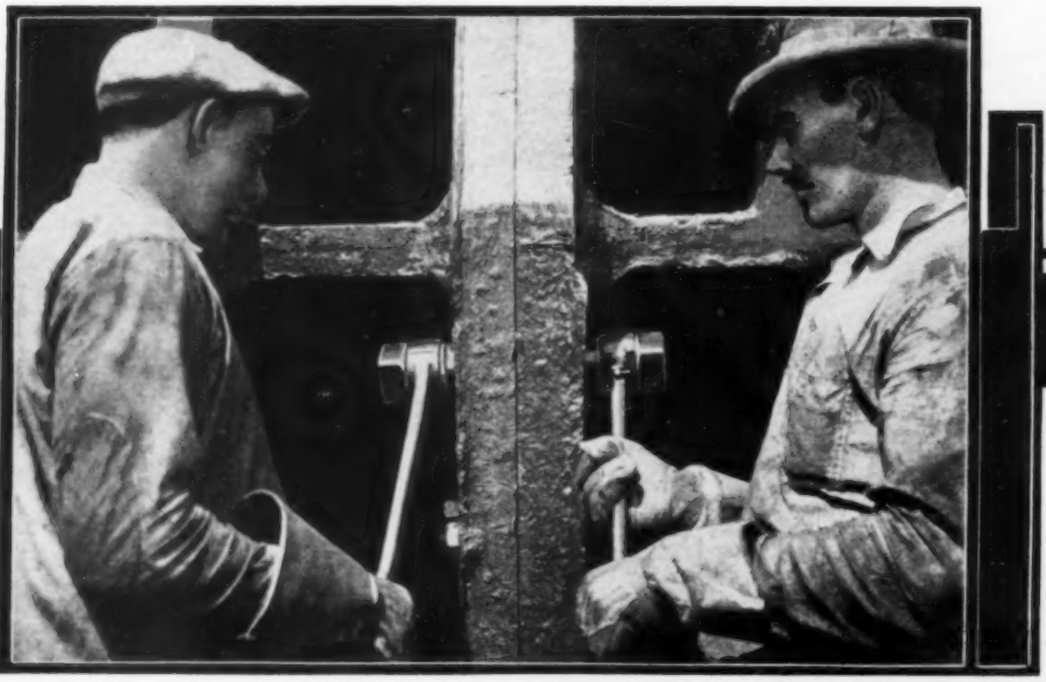
**T. L. SMITH**
Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.

**PARSONS**
Trench Excavators, Backfillers.

**KWIK-MIX**
Mixers, Plaster and Mortar Mixers.

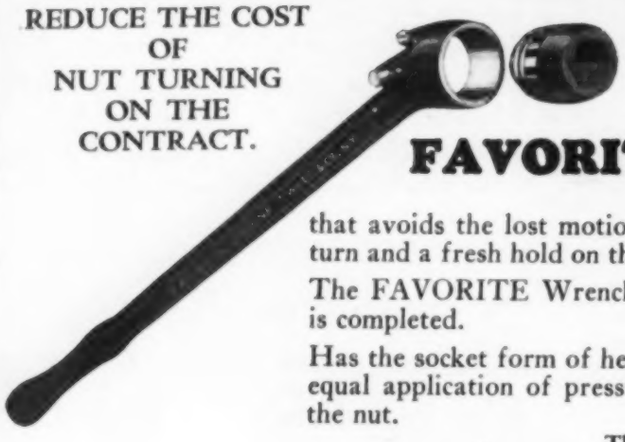
# National Equipment Corporation

*Milwaukee Wisconsin*



REDUCE THE COST
OF
NUT TURNING
ON THE
CONTRACT.

Now used on Piers of new Hudson River Bridge, at 176th St., New York City, being built by Port of New York Authority, cables constructed by John A. Roebling Sons Co.



## Use the
## FAVORITE REVERSIBLE RATCHET WRENCH

that avoids the lost motion of the open end wrench, with its part turn and a fresh hold on the nut method.

The FAVORITE Wrench does not leave the nut until operation is completed.

Has the socket form of head encompassing nut on all sides with an equal application of pressure, and therefore less liable to slip off the nut.

**The FAVORITE Wrench will speed up the nut turning portion of the contract and save money.**

***Send for full particulars.***

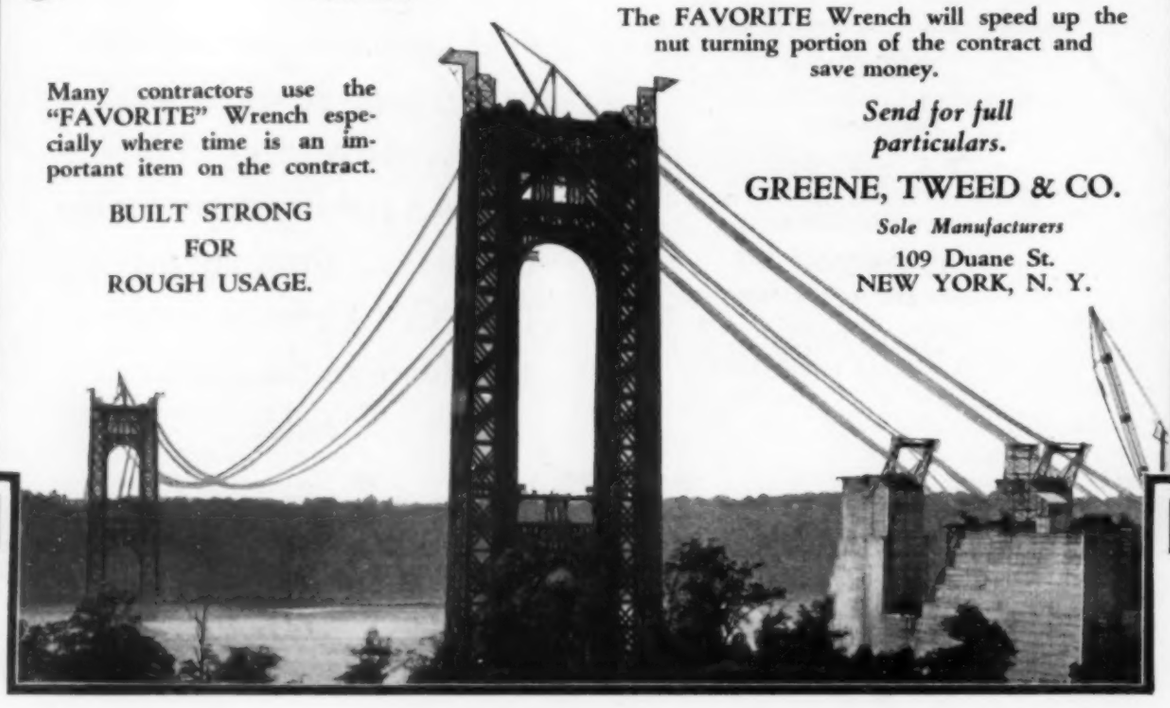
**GREENE, TWEED & CO.**

*Sole Manufacturers*

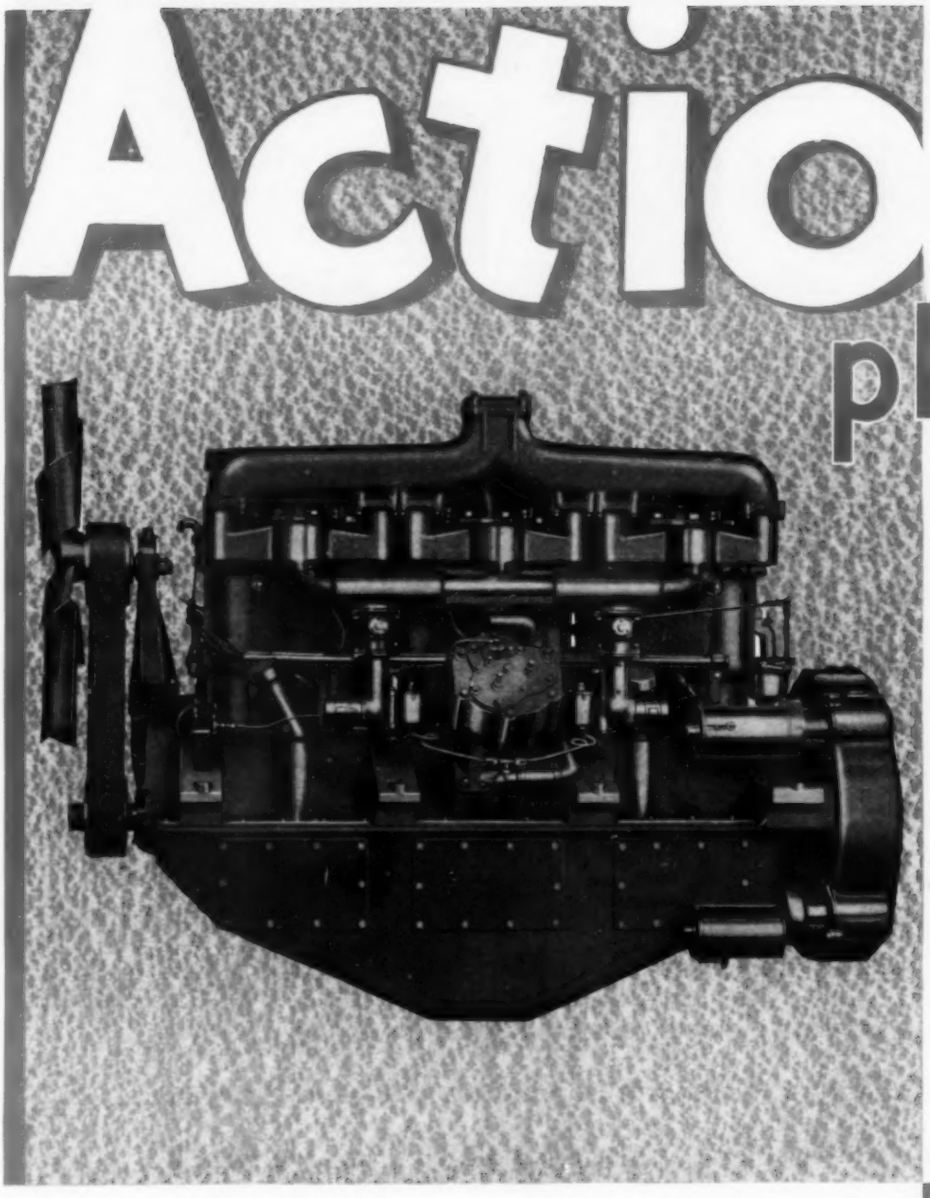
109 Duane St.
NEW YORK, N. Y.

Many contractors use the "FAVORITE" Wrench especially where time is an important item on the contract.

BUILT STRONG
FOR
ROUGH USAGE.



# Action... plenty



## WHERE LE ROI ENGINES WORK!

WHETHER they are gouging out the deepest excavation . . or spinning the propeller of the loftiest aircraft . . gasoline engines have but one function . . that is to supply ample power dependably . . . Le Roi Engines furnish uninterrupted power . . give action always to construction equipment, serving a wide range of applications. They are engines, tried, tested and proven . . the choice of contractors the world over who depend upon such machinery for profit. Standardize on Le Roi powered equipment . . it is a profitable policy.

**LE ROI COMPANY, Milwaukee, Wis.**

**LE ROI ENGINES**

LE ROI FOR DEPENDABLE POWER

# WHEN YOUR PROFITS DEPEND ON CUBIC YARDS HAULED

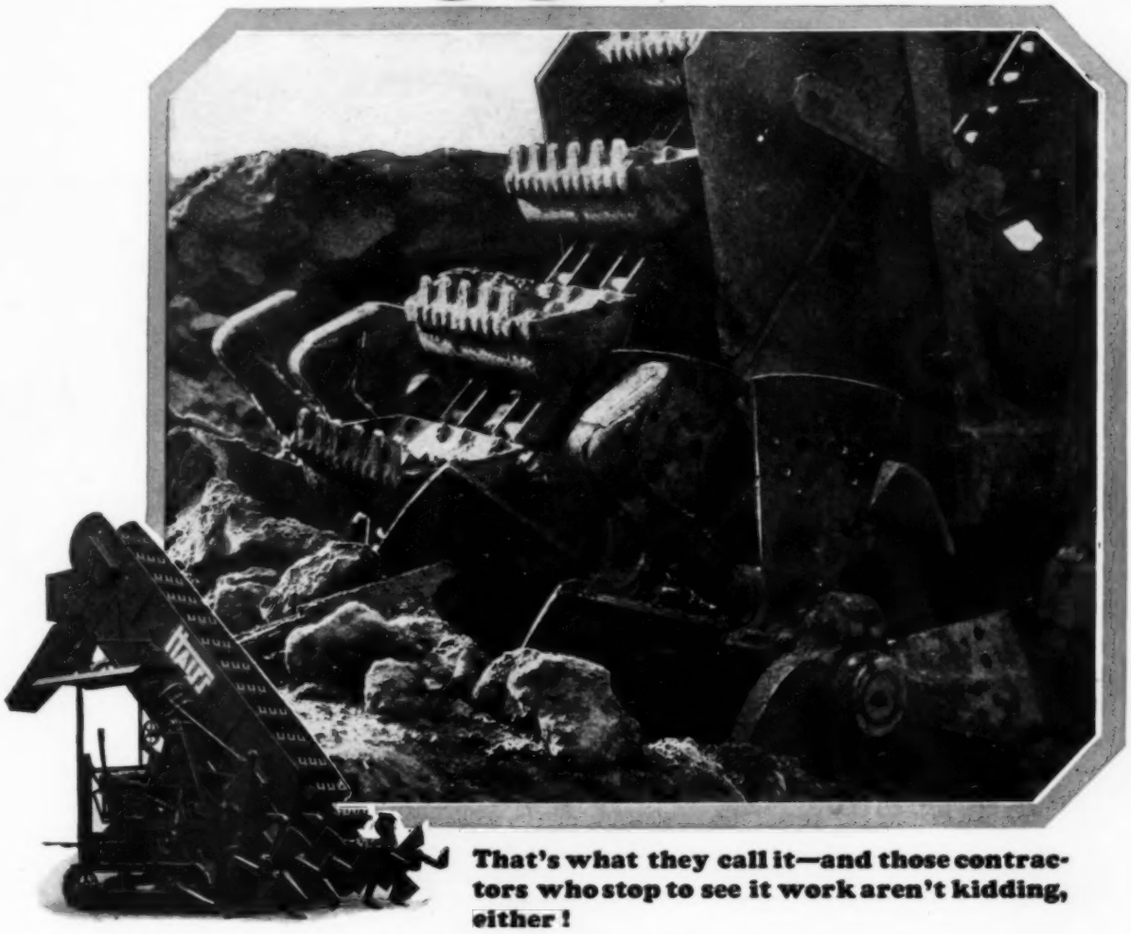
More time saved, more material hauled, more profit earned—the aim of every far-seeing contractor. And in the fulfillment of that end, motor trucks play an important part.

Hundreds of contractors—and tens of thousands of other business men—have found Dodge Trucks able allies. Regardless of weather or road, Dodge Trucks work dependably always. They are geared for time-saving speed and acceleration. They are sturdily built for gruelling service. They are easy to maneuver on the road or ahead of the road. They are economical to operate and maintain—throughout their unusually long lives.

Buy a Dodge Truck with assured safety to your investment. It will enable you to save more time, haul more material and earn more profits.

# DODGE TRUCKS

# "A Diggin' Fool"



**That's what they call it—and those contractors who stop to see it work aren't kidding, either!**

*"it digs without plowing"*

This picture is the "business end" of a Haiss Excavator working for Frenzel Brothers, Chicago, in grading out the traffic-beaten-down clay soil of an unpaved street. No plowing—even though the street had been road oiled as well as rolled down. It saved the expense of scarifying. And they were taking out 5 to 7 yard loads in 3 to 4½ minutes.

You can use this machine to make money—there's always shallow grading from a skimming pass to a 4 ft. cut. *Ask for Bulletin 629 and see the typical work that's pictured.*

HAISS EXCAVATOR

"IT DIGS"

GEORGE HAISS MANUFACTURING CO., Inc.
139th Street and Canal Place, New York, N. Y.
*Representatives in Principal Cities*

H-653

# *ANNOUNCEMENT*

The Business of
Atlas Portland Cement Co *and* Universal Portland Cement Co
Is Now Conducted by

## Universal Atlas Cement Co

*Subsidiary of United States Steel Corporation*

Atlas Portland Cement
Universal Portland Cement
Atlas White Portland Cement
Atlas Lumnite Cement

**The Atlas and Universal organizations are brought together thru the Atlas sale to the United States Steel Corporation of which the Universal company is a subsidiary.**

**The Atlas and Universal companies have grown up with the cement industry. Each is a third of a century old. The same general policies under which they have operated continue.**

**The combined productive capacity and sales territory will make cement of the joined companies more readily available to an increased number of cement users and thus improve the service to customers.**

**The new company assumes all the obligations of the Atlas and Universal companies so that relationships between buyer and seller are unchanged.**

**Plants of Universal Atlas Cement Co are at Hudson, N Y, Northampton, Pa, Universal, Pa, Buffington, Ind, Duluth, Minn, Hannibal, Mo, Independence, Kan, Leeds, Ala, and Waco, Texas.**

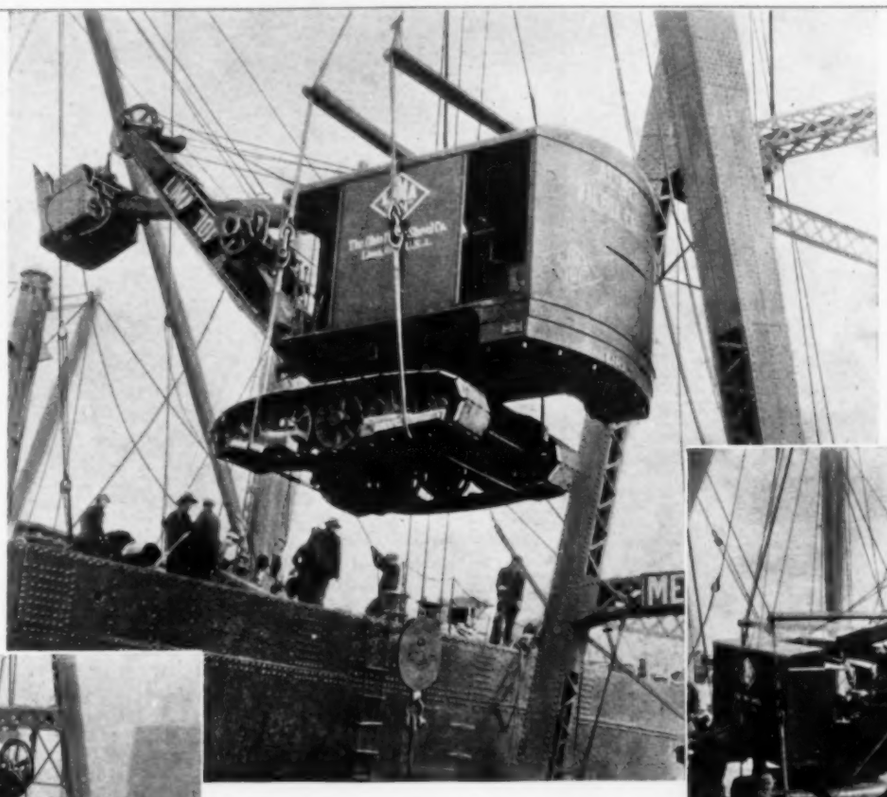
**Offices are in Chicago, New York, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Columbus, Minneapolis, Duluth, St Louis, Kansas City, Des Moines, Omaha, Oklahoma City, Birmingham and Waco.**

# Construction Methods

A McGraw-Hill Publication—Established 1919

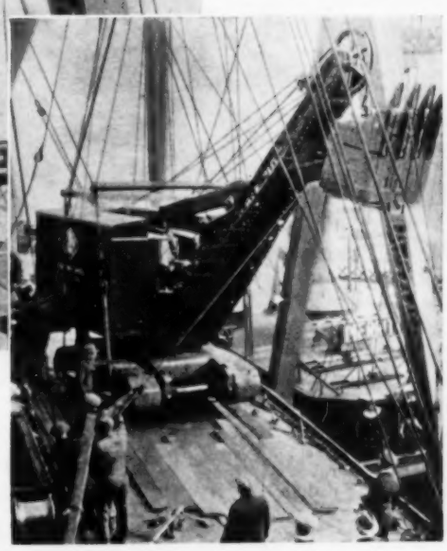
ROBERT K. TOMLIN, *Editor*

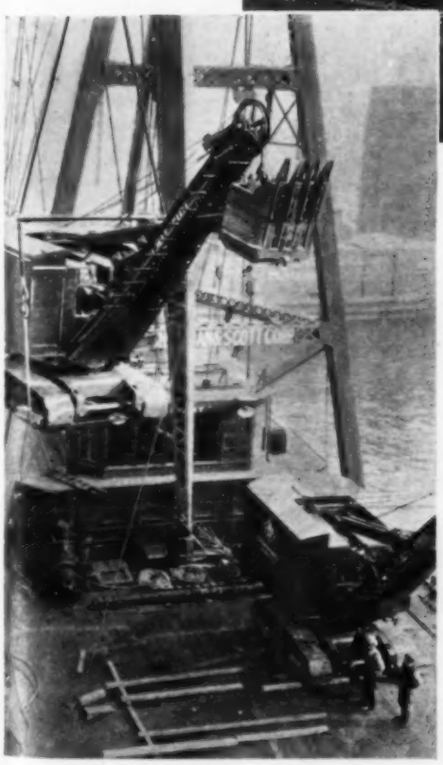
VOLUME 12 NEW YORK, FEBRUARY, 1930 NUMBER 2

COMPLETELY EQUIPPED (*right*) to move to job and start digging, 1¼-yd. shovel is lifted to deck of steamship for trip to Panama Canal Zone.

PLACED ON DECK (*below*) of steamship, grommet slings are removed, and, if necessary, shovel moves to final position under own power.



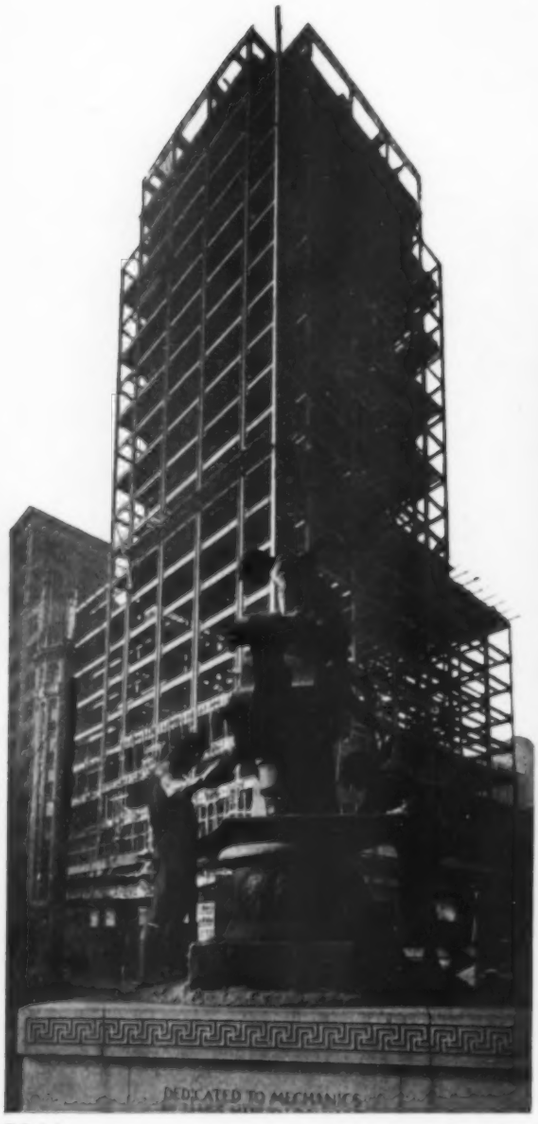


TWO SHOVELS are transported to ship on deck of derrick barge and are loaded without dismantling.

# SHOVELS *Travel Full-Rigged to Foreign Port*

READY to dig as soon as they land, two Lima 1¼-yd. gasoline shovels, weighing approximately 45 tons each, were placed intact on the deck of the Panama Railroad Co.'s S.S. "Cristobal" at the steamship's pier in New York City by the Merritt-Chapman & Scott Corporation's floating 100-ton derrick, "Century," to be transported to Balboa, Panama Canal Zone, where they now are grading the Albrook airfield. Al Geddes, who is performing the grading work under subcontract with the Austin Engineering Co., predicted that his shovels would be moving earth within a few hours after the ship berthed at Balboa. Mr. Geddes has advocated for a number of years this method of shipping shovels without dismantling, now used for what he believes to be the first time.

# *This Month's*



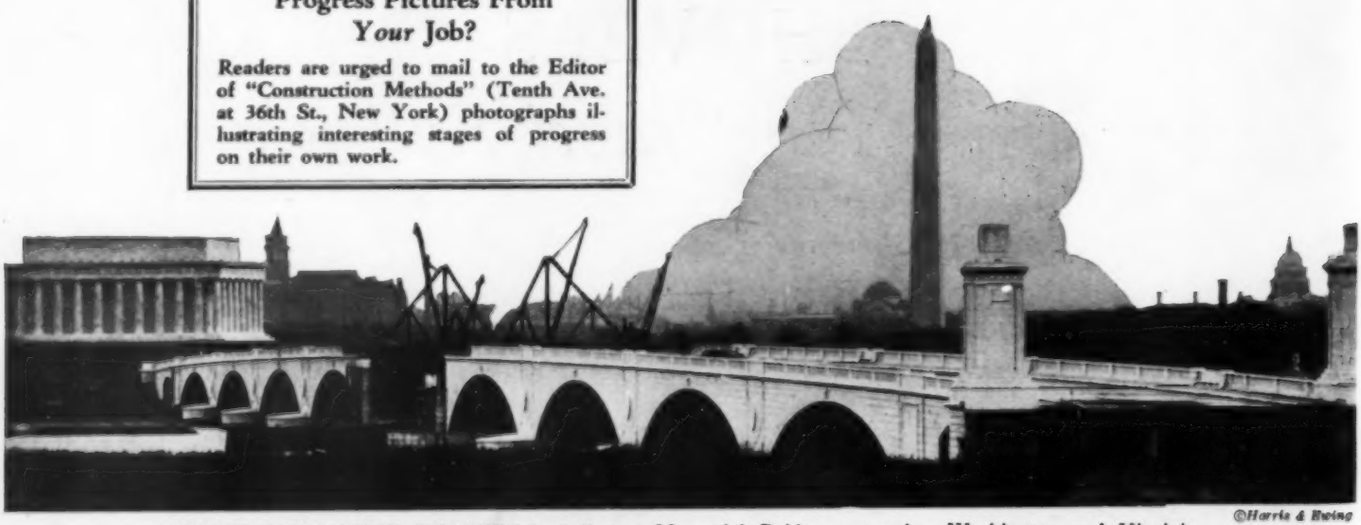

©P & A

NEW BACKGROUND for Donahue Monument, dedicated to mechanics, is this 28-story skyscraper erected in San Francisco to house offices of Shell Oil Co. of California. P. J. Walker Co., contractor.

ROUGH GOING FOR MAINE ROADBUILDERS. This work on U. S. Route 201 near Moscow, Me., involves the relocation of 12 miles of highway to make way for water power development on Kennebec River and construction of a 24-ft. gravel road. Five steam shovels were used on 4.2-mile section where this photograph was made. The Maine State Highway Commission, Lucius D. Barrows, chief engineer, is in charge of the work.

**Progress Pictures From *Your* Job?**

**Readers are urged to mail to the Editor of "Construction Methods" (Tenth Ave. at 36th St., New York) photographs illustrating interesting stages of progress on their own work.**



©Harris & Ewing

ALMOST READY FOR TRAFFIC is Arlington Memorial Bridge connecting Washington and Virginia. This view, taken from Virginia side, shows the Capitol dome (right), Washington monument and Lincoln Memorial (left). Hunkin-Conkey Construction Co., Cleveland, has contract for superstructure.

# "News Reel"

UNUSUAL TRENCHING MACHINE *(right)* is employed in digging underground railway line in Germany, which will be completed in spring.

© *Keystone*

MACHINES SUPPLANT HAND LABOR *(above)*. Caterpillar 60 and Russell grader slope 2 to 1 sides of Chenery reservoir at Clyde, Calif., now under construction for California Water Service Corporation by A. B. Hauser, contractor of Stockton, Calif.

SCIENCE AIDS BRICKLAYERS. Members of Eastern Face Brick Manufacturers' Association *(above)* observe panels erected at Pittsburgh under direction of Dr. F. O. Anderegg of Mellon Institute of Industrial Research to study various problems of brick wall construction.

WASTE GATES through Diablo Dam on Skagit River being built by Winston Bros. Co. of Minneapolis for City of Seattle. Description of unusual features of this work, pp. 60-62, August, 1929, issue of *Construction Methods*.

**Photo from**
**R. R. HUBBARD,**
**Supt. of Construction, City of Seattle**
**Diablo Dam,**
**Rockport, Wash.**

# INDIANS AND *Transport for Kaibab Trail in Grand*

SUPAI INDIANS pack main cable down 7½-mile trail to bridge site, each of 42 men carrying load of approximately 50 lb.

By FRANK A. KITTREDGE
*Chief Engineer, National Park Service*

HORSE drags wind cable, to guy bridge against swaying, on skid with wheels under rear end.

ALL materials entering into the construction of the Kaibab Trail suspension bridge across the Colorado River in Grand Canyon National Park rode to their final destination down 7½ miles of steep, winding trail on the backs of men or beasts. The new bridge, which replaces an older suspension structure of light design, is 500 ft. long between cable supports. with a 440-ft. stiffening truss made up entirely of members less than 10 ft. in length and less than 200 lb. in weight, the size and weight being limited by the difficulties of transportation.

To facilitate construction and to permit keeping the trail open. it was decided to build the new bridge directly above the old one. Presence of the old bridge aided erection of the new, but, also made it necessary to exercise extreme care in blasting excavations for the new anchorages below the old.

*Design*—The new bridge is designed according to standard practice except that it was necessary in several instances to modify details to suit the type of transportation available. Width between trusses is 5 ft. The live load assumed for the new bridge was a continuous line of loaded pack animals with an additional 40 per cent of this amount added for impact. Assuming a factor of safety of 3½, this loading, plus dead load, would have required single main cables approximately 3 in. in diameter. Such cables would have been extremely stiff and difficult to transport down the narrow trail with many abrupt turns, with the added danger of having the galvanizing destroyed and the life of the cable thereby impaired.

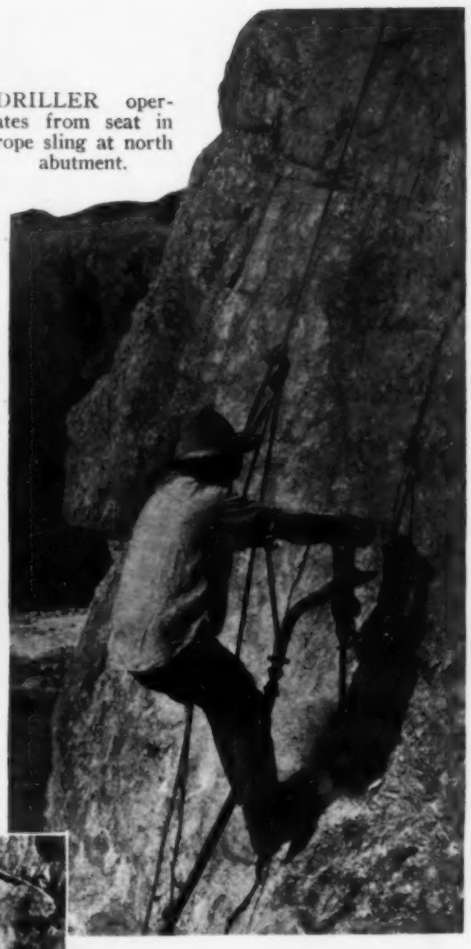
PACK train arrives at bridge site; approximately 2½ tons ready to be unloaded.

To minimize these difficulties, four 1½-in. cables were adopted to form each of the two main bridge cables. Although these smaller diameter cables were much more flexible and greatly reduced the maximum load to be transported, the cost of moving them to the bridge site nearly equalled their original cost at the factory.

Provision against wind-sway consists of cable guys attached directly to the bridge at the center and diverging to up and downstream anchorages. Cable ties connect these guys to the bridge at intermediate points to minimize secondary sway between the center and the abutments.

The floor consists of ¼-in. flat steel plates riveted rigidly to the floor beams and covered by a

# PACK ANIMALS
## *Material Suspension Bridge Canyon*

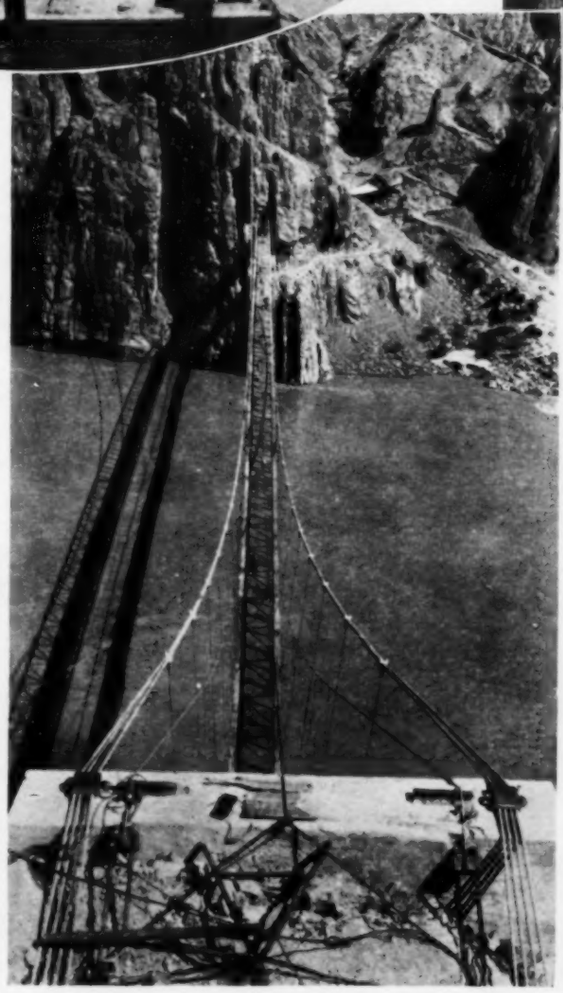


DRILLER operates from seat in rope sling at north abutment.

ANCHORAGE ASSEMBLY provides for four 1½-in. wire ropes composing one main cable.

2-in. wearing surface of asphaltic concrete. This wearing surface consists of four parts of screened aggregate obtained at the site and one part of emulsified asphalt mixed with the aggregate and spread without the application of heat. Bringing the asphalt to the site presented another transportation problem. It was solved by packing the asphalt in 5-gal. tin containers at the refinery, these cans being convenient for delivery by pack animals.

*Erection*—The first step in erection required the transporting of 122 tons of materials and supplies from the terminus of truck transportation to the bridge site down 7½ miles of trail having an average grade of 12 per cent. This work occupied a period of 3 months and for part of this time a maximum of seven packers and 42 pack animals were employed. Notwithstanding the awkward character of most of the loads, not a single animal was lost or injured during the entire period. The eight main cables were unreeled and carried down the trail one at a time by a crew of 42 Indians who made the round trip in two days. The load per man was about 50 lb. Wind cables were shipped in one piece on a single reel, and the reel was mounted on a skid with wheels under the rear end and dragged down the trail by horses. This method proved more economical but much slower than the employment of a crew of men.



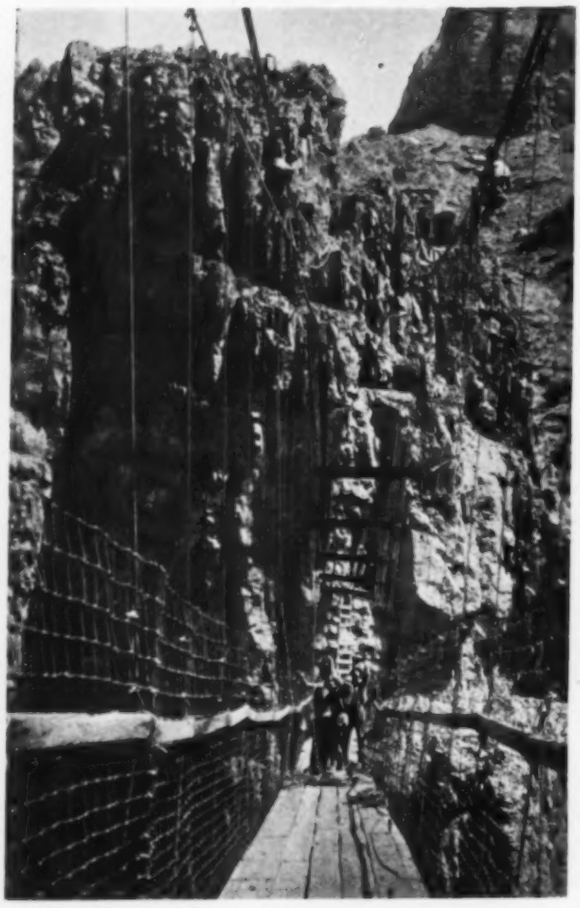
NORTH CABLE BEARING supports old and new cable systems. New main cables consist of four ropes each.

The design called for the new cable anchorages 7½ ft. below the supports for the old bridge, making it impossible to use open cut excavation in the rock of the canyon walls. It was necessary to tunnel below the existing anchorage, the excavations requiring extreme care in blasting to avoid disturbing the old anchorages. Drilling for the anchorages was done by compressed air from two compressors of 80 cu.ft. capacity each. Use of the old bridge facilitated the stringing of the cables and they were raised to position and adjusted by means of a common 30-ton hand-operated stump puller.

Following adjusting of the main cables erection proceeded on the floor system and stiffening truss. Each panel, consisting of floor beam and two verticals, was riveted together at the bridge site

and transported by hand cart out on to the old bridge to its approximate position. After attachment was made to the hanger cables, the frame was raised to position and rigged into place by men suspended in slings from the main cables. The next step was to rig a high line over the center line of the bridge and hoist the remaining material into place. The floor system was riveted into two-panel sections before taking it out on the old bridge for placing. Floor plates and guard angles then were bolted on, followed by the truss members. The wind cables next were connected, and main cables and wind cables were adjusted for final position and correct alignment. After these steps, field riveting was completed and guard rails bolted on. Wire fencing weighing 12.3 lb. per rod then was placed as a safety precaution along the sides.

Drilling for the abutment excavations and for the south upstream wind cable anchorage was accomplished with considerable difficulty, as the driller had to work while suspended in a rope sling. The wind cable anchorage was particularly inaccessible, and it was necessary to swing the driller in a rope sling 125 ft. below the top of the cliff.

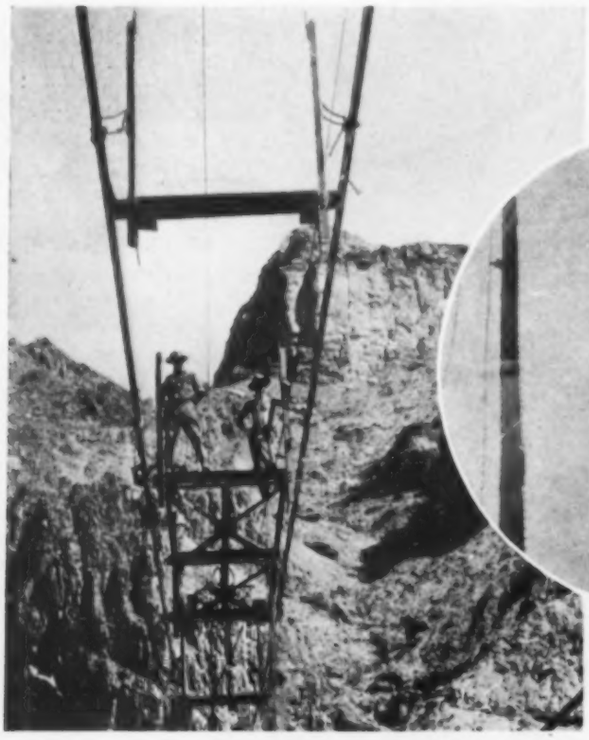


CROSS FRAME, consisting of floor beam and two verticals, is attached to hangers, raised to position, and rigged into place by workmen seated in boatswain chairs hung from main cables.

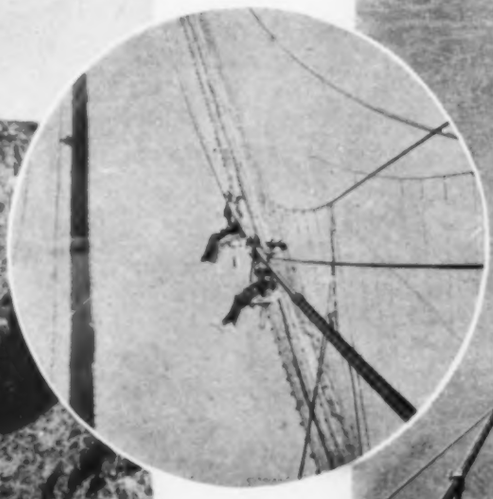
Two new approaches were provided to complete the improvement and to increase safety. The south approach is through a tunnel 105 ft. long with a cross-section of 6 ft. x 10 ft. high. This tunnel permits traffic to enter the bridge on a tangent and eliminates a dangerous section of trail. The north approach is provided by a spiral from the old trail under the new bridge up to the elevation of its abutment. These approaches have proved very effective and safe.

After completion of the new bridge, the old bridge was removed piece by piece, working both ways from the center, and the material was carried ashore and stored. Total cost of the new structure in place, exclusive of approaches, was $31,781.

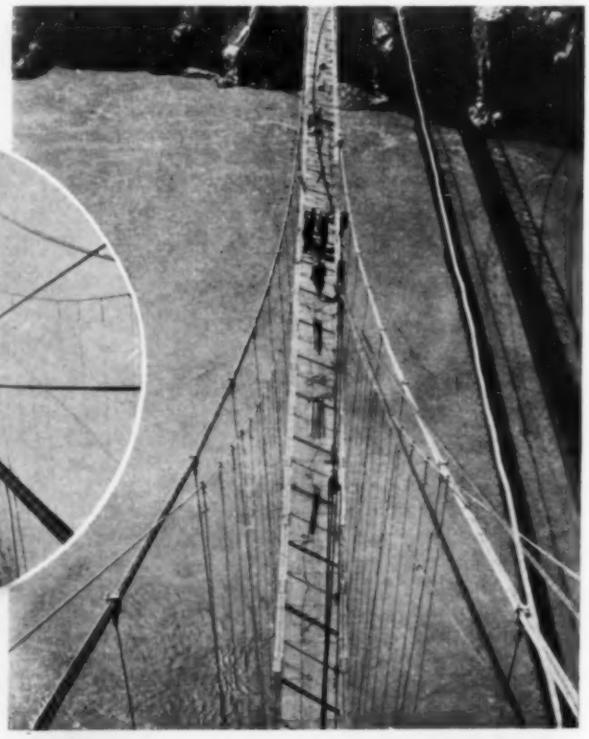
Design and construction of the bridge were under the general supervision of the writer. The design was prepared by W. P. Webber, designing engineer in the San Francisco office of the National Park Service, and erection was in charge of J. H. Lawrence, construction engineer. M. R. Tillotson, superintendent of Grand Canyon National Park, supplied the pack outfits. Cables were furnished by the Hazard Wire Rope Company, of Wilkes-Barre, Pa.



TWO-PANEL SECTION of floor system is placed from high line at center of span.



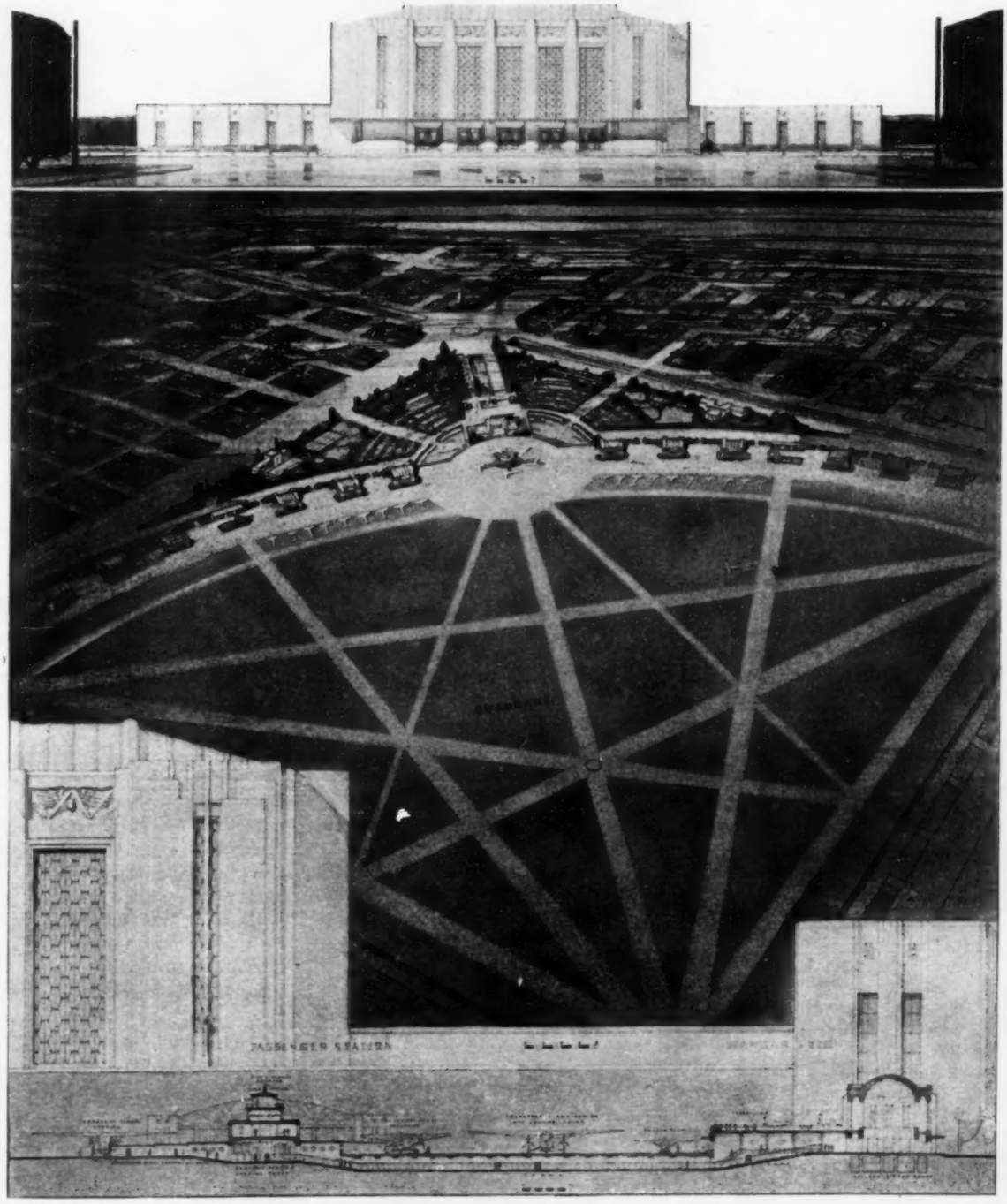
LOCATING hanger points on main cable.



COMPLETED BRIDGE seen from north cable bearing previous to demolition of new bridge.

# *Design Prize Won by*

# QUADRANT AIRPORT



FIRST prize of $5,000 in the Lehigh Airports Competition was won by A. C. Zimmerman and William H. Harrison, associated architects and engineers, of Los Angeles, Calif., for their conception of a modern airport to serve a typical American City. Prizes totaling $10,200 were awarded by the Lehigh Portland Cement Co. in this contest, the first of its kind held in the United States.

The design concentrates all buildings in one corner of a rectangular field, leaving a quadrant-shaped flying area with appropriate runways and taxi strips. A passenger terminal building with underground access to loading and unloading points is flanked by hangars at the edge of the flying area, with automobile parking spaces, hotel, recreation building and shops arranged in a triangular park.

The Jury of Awards, headed by Raymond Hood, architect, commended the winning design for its logical and ingenious use of all elements for the comfort and convenience of passengers and fliers. The main runways for the planes are joined by narrow taxi strips and a broad semi-circular apron, giving access to either end of each runway without interfering with other planes that are arriving or departing.

# SPECIAL *Place Concrete Lining* KITTITAS

CONTRACTORS on the Kittitas division of the Bureau of Reclamation's Yakima project in central Washington devised some unusual equipment to line 13 miles of the main canal with concrete. A special device employed in placing and tamping concrete on the side slopes was the most notable feature of this equipment.

The lined earth portion of the canal is designed to carry a 9.75-ft. depth of water. Concrete lining 3 in. thick was placed over the floor and on the sides to a height of 11 ft. The floor is 12 ft. wide, and the sides lie on a $1\frac{1}{4}:1$ slope.

*Drainage*—A major problem was the drainage of lined sections to prevent upheaval of the lining by ground water pressure when the canal is empty. To provide for the escape of ground water, drains were laid under the entire length of the lined canal, and particular care was taken to prevent surface water from getting behind the lining.

*Excavating Methods* — Excavation was made with power shovels, draglines and clamshells. The shovels were used principally to prepare benches along the steep side hill on which the draglines could travel and to remove material in the rock cuts. Ordinarily the canal section was dug by draglines working from a position near the center line of the canal. In several cases, on account of the depth of cut and height of spoil banks, the dragline made two trips—down one side and up the other.

In one instance two draglines were used to excavate one of the largest cuts. The first cut, to an elevation 2 ft. above the top of concrete lining, was made by a machine with an 85-ft. boom and a $2\frac{1}{2}$-cu.yd. bucket, operating along one side of the cut. This finished, a dragline with a 60-ft. boom and a 1-cu.yd. bucket was put in the bottom of the excavation to complete the canal section to grade. The smaller machine, taking material from the canal section, deposited it where it would be in the path of the larger machine while on its second trip to finish excavation along the opposite side.

DRAGLINE excavates portion of main canal. These machines usually dig full canal section from position near center line. In deep cuts and where spoil banks are high, dragline makes two trips, one along each side of canal.

AFTER ROUGH SHAPING BY DRAGLINES, men with shovels trim slopes to exact grade. Clamshell buckets remove material deposited on bottom of canal by trimming operations.

After the canal section roughly had been trimmed to slope stakes by the power equipment, a 3x8-in. header was set along the top of the slopes to mark the limits prescribed for the lining. Running at right angles to this header, 2x4's then were set in each slope 10 to 16 ft. apart, according to the contractor's preference, and men with shovels and screed board worked down the slope and trimmed it to exact grade. The slopes were kept sprinkled until the concrete was poured to prevent the surface drying and blowing away.

*Placing Concrete*—The mixing plant was set up on the roadway maintained on the lower bank of the canal and was moved along as the work advanced. Concrete was chuted directly from the mixer to the near slope or delivered in hand buggies by means of a movable

TRAVELING PLATFORMS aid workmen in placing temperature steel on side slopes. Reinforcement consists of ⅜-in. round deformed bars on 24-in. centers transversely, and on 12-in. centers longitudinally, supported from bottom and sides on small concrete blocks.

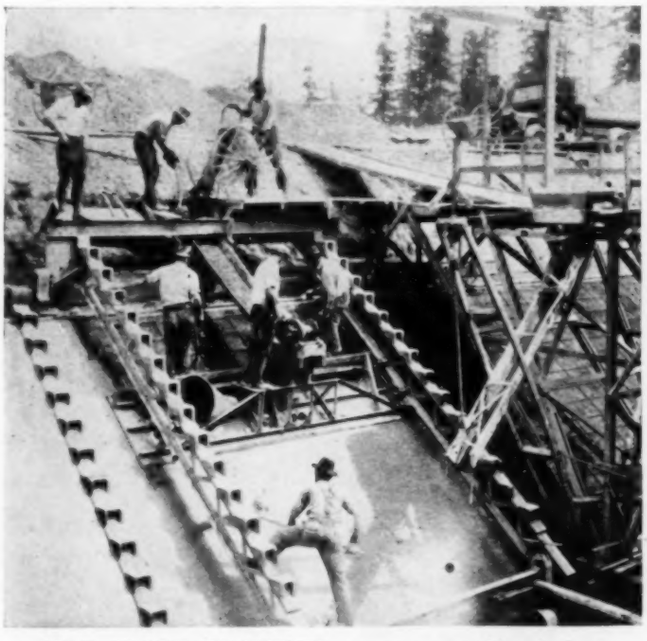
# MACHINES *on Half of 26-Mile* CANAL

bridge to chutes serving the bottom and the far slope. Side slopes were placed simultaneously, working from the bottom up. The floor was placed immediately after the side slopes had been completed, the planks on which the movable platform, or jumbo, traveled having been removed as soon as the jumbo was in position at the next panel. A 14-ft. length of lining was completed in each pour.

*Side Slope Device*—A feature of the canal lining operation was the device that served both as a working platform and as a top form for placing concrete on the side slopes. This included a steel panel about 3½x14 ft. in size supported at either end on light steel trusses on which it could move up the slope as the work progressed. A crew of three men working on this panel tamped the concrete firmly in place beneath it and moved the panel up the slope when necessary. The weight of the form, loaded with equipment and crew, was enough to tamp the concrete vigorously without danger of causing sloughing. Jacks at either end of the light steel trusses adjusted the form to the exact thickness of concrete desired. The trusses were held firmly as part of a rectangular frame by I-beams at the top and bottom of the side slope.

This method of tamping the slopes was found to be highly satisfactory, particularly because of the greater degree of impermeability obtained. The resulting concrete is considered by those in charge as superior to that obtained where the ordinary method of placing concrete canal lining is used.

Contracts including canal lining operations described herein were carried out by the General Construction Co. of Seattle, the Derbon Construction Co. of Seattle and S. H. Newell & Co. of Portland, Ore. The project is being built under the immediate direction of Walker R. Young, construction engineer, U. S. Bureau of Reclamation.



SIDE SLOPE TRAVELER supports movable platform and top form unit pulled up slope by hand winches. Workmen on platform tamp concrete under form panel.

CONCRETE IS SPRAYED during curing period from pipes laid near top of side slopes. Lining 3 in. thick is placed on bottom of canal and up side slopes for vertical distance of 11 ft.

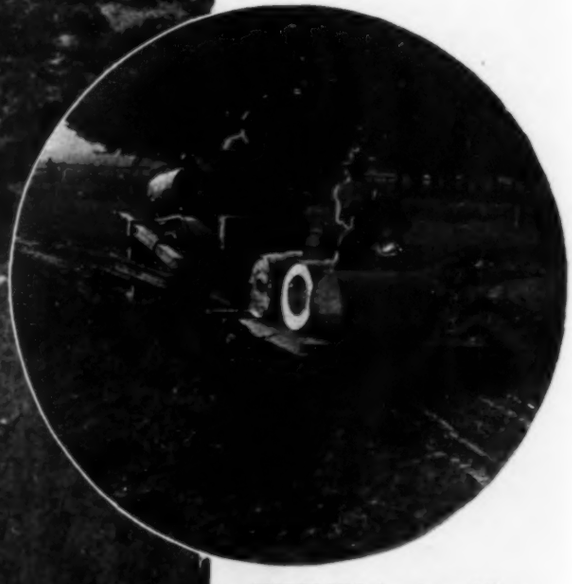
# *Tractors Help Pipe Welders to Complete* 250-MILE LINE *in Six Months*

COMPRESSOR *(left)* on truck mounting is pulled through stream and up steep bank by Caterpillar 30 tractor.

TRACTOR power to haul materials and equipment and to backfill trenches played its part in the early completion of the Pacific Gas & Electric Co.'s 250-mile 20-in. pipe line from the Buttonwillow and Kettleman Hills gas fields to the San Francisco Bay cities. About 50 per cent of the pipe was wrapped, most of the wrapping being done in the field. A wrapping machine was used which enabled the pipes to be fed through the machine without stopping. This improvement increased the output for 20-in. pipe from 3,500 lin.ft. to a maximum of 10,000 lin.ft. in 8 hours.

The welding operation governed the speed of construction. About 100 welders were kept at work, mainly with acetylene outfits, although one contractor supplemented these with portable electric sets.

BULLDOZER mounted on tractor backfills natural gas line just outside San Francisco.



SUPPLIES for the welding and pipe-laying crews are hauled to the line on sleds.

# WHEN SHOULD *Equipment* BE REPLACED?

Second and concluding portion of article begun last month, indicating how operating costs may be reduced by substituting new for old machinery on construction work.

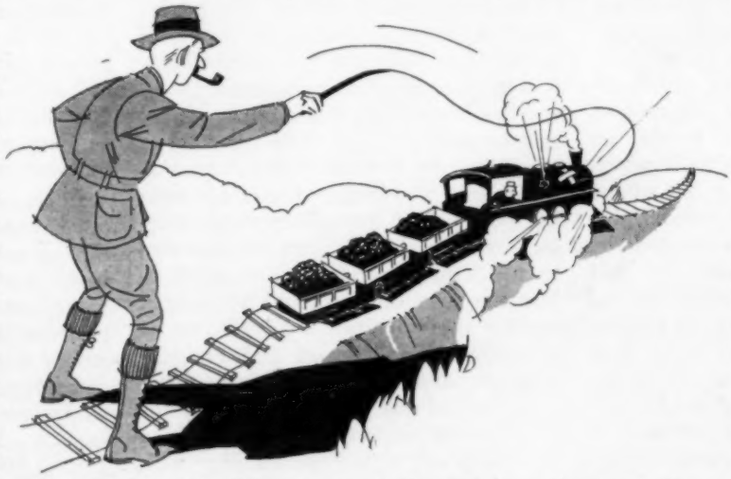
*By a Highway Engineer*

SOME kinds of equipment lose productive capacity as they wear out. (See first installment of this article in last month's issue of *Construction Methods*, p. 61.) The term "productive capacity," as here used, refers to the capacity for output while the machine is operating. It is important to distinguish between productive capacity and dependability, for, while both affect production, the nature of the effect in the two cases is quite different. Productive capacity affects production through its effect on the rate of output, while any loss in dependability affects production because it reduces the number of producing hours.

A reduction in the rate of output of any piece of primary equipment is a serious matter; a similar reduction in the rate of output of secondary equipment may be of no particular consequence. This condition arises from the fact that production almost always depends on a series of correlated operations among which one operation dominates. Thus, concrete cannot be poured faster than the mixer will mix it, no matter what the capacity of other—that is, of secondary—machines, may be.

As a matter of working policy the capacity of the secondary machines is made definitely greater than that of the primary unit so that minor delays and breakdowns have little effect on the output of the primary unit. In factory production storage is inserted between successive operations to wipe out the effect of minor delays and breakdowns, but in field construction work this condition seldom is possible, and therefore needs no consideration here.

Take a concrete paving job, then, for the further illustration of this point: To avoid the effect of minor delays at such points as the crane, the hoppers or in finishing it is the general practice to select machines which have an output capacity considerably greater than the output capacity of the mixer. It is apparent, therefore, that there can be a considerable falling off in the output capacity of any unit in this secondary equipment before production for the job as a whole will be affected. Moreover, this falling off in output capacity is not likely to affect cost because the number of men employed about any particular machine is fixed by the nature of the machine and the conditions under which it works. For the secondary units, with their large surplus capacity, loss in output neither affects the rate of production for the job as a whole, nor the cost of operating the unit itself, so it is not a factor in production cost.



*Some kinds of equipment lose productive capacity as they wear out*

*Obsolescence*—The same may be said of various phases of obsolescence. A new machine is developed which is faster or more flexible in its operation, easier to operate, or in some other way shows definite advantages over types in use. There always is a tendency to substitute such equipment for that in use, but this is not uniformly desirable because such considerations as greater flexibility, greater speed and higher output capacity have little or no value if the equipment already in use has all of the output capacity which conditions require. To replace a finishing machine which can handle 2,500 sq.yd. of pavement a day satisfactorily with one which by reason of improved design can handle 3,000 sq.yd. equally well, can yield no particular benefit if production never exceeds 2,000 sq.yd. a day. The finishing machine cannot determine the output for the job as a whole unless its own capacity falls below the production of the mixer.

The development of new machines which yield a lower operating cost, however, offers a different problem, to be discussed later.

Loss in productive capacity of a subsidiary unit is generally of little or no consequence, but loss of output capacity in the primary unit is of vital concern. In the relationship $K = O/P$, which is the relationship that applies, it is apparent that the value of $K$ (the unit production cost) is increased by any condition which reduces $P$ (the production per day) without producing a corresponding reduction in $O$ (the daily cost of operation). But it is innate in conditions of modern construction work, as it is in conditions of modern plant operation, that the force employed is dictated by the machines used and the methods employed. The men, in other words, work on and about the machines, and if any production at all is secured, all of the operations must be performed.

For the same reason depreciation is pretty constant, as is operating expense (fuel, oil, etc.). But, while production is the result of a series of operations, its rate is governed at some one point by the output of the primary unit. So, the amount of production resulting from the whole series of operations is

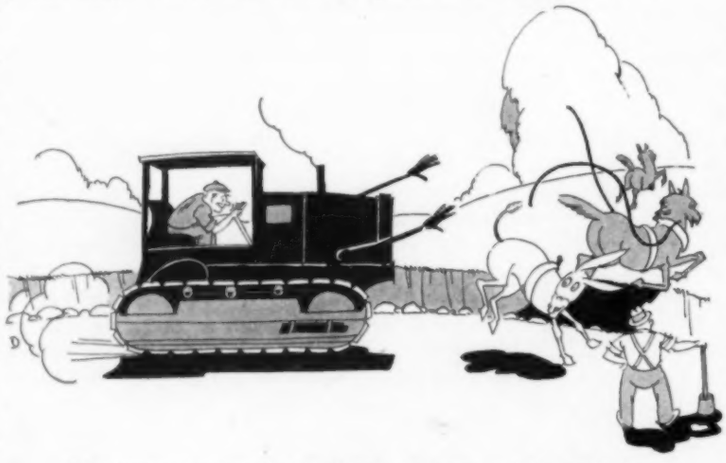
both governed by, and the same as, the output of the primary unit. Under such a condition, whatever reduces the output of the primary unit reduces the output of the job. But because all the equipment must work to secure any production at all, a drop in the rate of output is not likely to affect the daily cost of operation, $O$, though it does reduce $P$, the amount of the production. From this it naturally follows that unit costs increase in inverse proportion to any loss in the rate at which the primary unit operates.

*Effect on Cost*—Under such a condition the cost of any drop in productive capacity of the primary unit may be nothing short of startling. The daily cost of operation on a concrete paving job (exclusive of materials used) will often exceed $400 a day. If, because of functional inadequacy in the mixer, the rate of production falls to 90 per cent of normal the unit production cost rises to about 111 per cent of what it should be. Or, put in a little different way, if $400 is spent in order to accomplish what, in fact, is but 90 per cent of a full day's work, a full day's work really costs $444.44—the added cost of $44.44 in this case being altogether chargeable to the loss in the output capacity of the mixer, that is, to functional inadequacy. A season's work of 120 days, done with a mixer which can not produce more than 90 per cent of normal capacity will, then, develop an extra cost of more than $5,000, which should be added to the first cost of the mixer, plus renewals and repairs, plus payroll and other losses caused by breakdowns (as outlined in last month's article), if the full cost of having such a machine is to be known.

*A number of instances have been noted where the correction of low dependability and functional inadequacy in the primary unit by the purchase of a new unit would have reduced operating cost enough to pay for a new unit of the most modern design out of the savings produced in less than 10 miles of standard 18-ft. pavement.* As this is an amount of pavement which the more expert contractors would expect to lay in less than three months—weather conditions being reasonably satisfactory—the importance of these factors needs no farther emphasis.

The same condition is to be found in other construction fields. There is a general tendency to keep machines which function as primary units in service long after an analysis of the effect of their condition on the average annual cost of owning them shows that they are "worn out"—that is, that their condition is responsible for a cost situation that could be improved radically by installing new units. Indeed, it is safe to say that losses in dependability and losses in the productive capacity of primary units are the largest cost item properly chargeable against such equipment. Often they have been allowed to become so large an item as annually to generate costs in excess of the first cost of new equipment.

That such a condition can exist at all appears to be due to the fact that it never has been the practice to charge the cost of low production emanating from these causes against the equipment responsible for it. It is not to be presumed that any wide-awake business man would continue a machine in service beyond its useful life if his cost-keeping practices were adequate to enlighten him as to the real facts. For this reason, as a matter of cost-accounting policy, both payroll expenses during breakdowns and extra expense due to any reduced production traceable to lost output capacity, should be charged against the machines involved just as scrupulously as repairs and reconditionings are charged against them. Only in this way may the necessity for maintaining important machines in a condition of high dependability with unimpaired productive capacity be made clear, and the need for replacing such machines when there is any loss in either dependability or in productive capacity be emphasized properly.



*The tractor has practically driven the horse and the mule from the paving job*

*Reduced Operating Cost*—While the principal influences tending to bring about the replacement of old equipment are cost of repairs and replacements, and, particularly in the case of primary units, output capacity, it happens that new machines are developed which can produce at a reduced cost—a condition which always suggests the replacement of old units. Take the case of a lower production cost which is, in essence, based on a higher operating speed. From the relationship $K = O/P$, it is apparent that this can easily take place, the cost of operation, $O$, remaining constant, but the productive capacity, $P$, being increased. This being the case, if production under field conditions can be brought into harmony with the productive capacity of the machine, $K$, the unit cost of production can be reduced by installing the new machine. It is equally apparent that if the additional capacity for production can not be utilized nothing will be gained by purchasing the new equipment.

It has been pointed out that a large part of the equipment on most construction jobs is subsidiary equipment with a large surplus output capacity. Replacing equipment of this kind, which is functioning in a satisfactory manner, with new equipment capable of yielding a lower unit cost only because it has a higher output capacity is not likely to develop any appreciable saving because, under the conditions usually prevailing, the additional output capacity can not be utilized. Thus at a stone-crushing plant, if the screens now in use can handle 100 cu.yd. of material an hour satisfactorily, nothing is gained by installing new screens capable of cutting the cost of screening if operated at the rate of 125 yd. an hour as long as the crusher, the primary unit, can deliver only 80 cu.yd. an hour.

*Replacing a Primary Unit*—On the other hand, any improvement in the rate of output of a primary unit is of immediate interest. Take the question of replacing a primary unit which experience has shown develops an average annual cost about as shown in the accompanying table by a unit having a 20-per cent larger output capacity.

| | |
|---|---|
| Original cost | $5,000 |
| Repairs first year | 200 |
| Lost time costs | 400 |
| Total | 5,600 |
| Trade-in value | 2,000 |
| Annual cost if traded in every year. | 3,600 |
| Repairs, etc., second year | 1,200 |
| Lost time costs, second year | 1,000 |
| Total | 7,800 |
| Trade-in value, end of second year | 1,000 |
| Average annual cost of ownership if kept two years | 6,800 / 3,400 |
| Gross saving if kept two years | 400 |
| Repairs, third year | 2,000 |
| Lost time costs, third year | 2,400 |
| Total | $12,200 |
| Trade-in value at end of third year. | 500 |
| Total | $11,700 |
| Average cost of ownership if kept three years | 3,900 |
| Gross loss if kept three years | 1,500 |

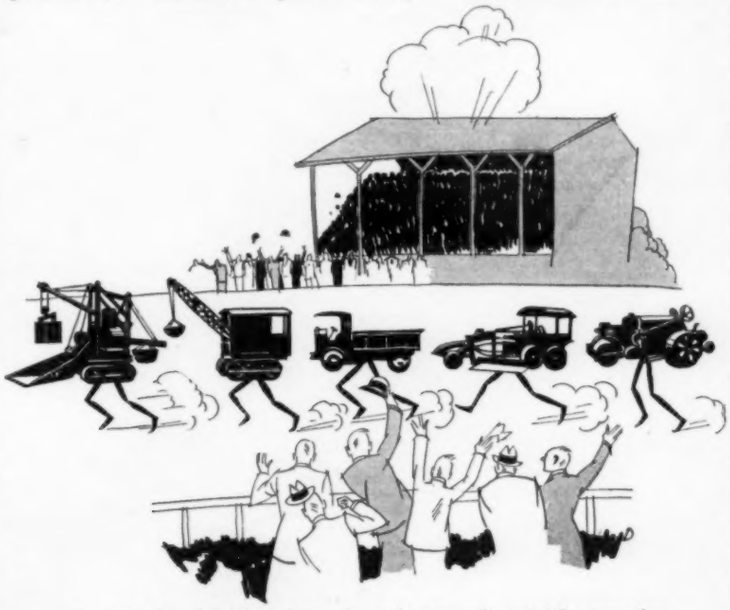
It is apparent in a case of this kind, typical of primary equipment, that the annual cost of ownership is not much affected by the length of time the machine is continued in service if that does not extend into the period when loss of dependability and loss in output capacity cause the cost of ownership to mount rapidly. So the loss due to exchanging an old unit for a new one is not likely to be of much consequence.

If it is assumed that an exchange is to be made at the end of the first year of the machine's service, the loss over keeping the machine two years is slight in this case, only $400. Against this cost is the increased capacity for output which, by the terms of the problem, is 20 per cent. Also, by the terms of the problem, operating cost is not improved, so if the increased output capacity is utilized, unit production cost, $K$ (exclusive of materials), will drop about 16 per cent. The number of units involved and their cost when produced by the old machine provide a ready means of determining the saving to be had, usually a large item compared with any loss from exchanging a piece of equipment which is serving as a primary unit, even though it is quite new.

The shift from the 21E pavers (5-bag machines) to the 27E pavers (6-bag machines) created exactly the condition defined above—greater output capacity with practically no change in operating cost. On most jobs the surplus output capacity of the secondary equipment was so high that changing to the larger paver required little or no change in other equipment. Production rose at once in direct proportion to the increase in the size of the mixer. Since the secondary units did not have to be replaced there was very little increase in operating cost. As a result, unit production costs (exclusive of materials) dropped sharply.

On the other hand, if the change in the rate of output is so great that in order to take advantage of it the secondary equipment must be replaced as well as the primary equipment, the advantage of a reduced production cost must be equated against the cost of exchanging the primary unit plus the cost of exchanging the secondary units. Usually, even when this takes place, the lower production cost will justify the exchange, the number of units of work to be handled before the exchange becomes profitable being, as a rule, rather small. It is essential, however, that each case be given separate study, for improved rates of production cannot be converted into profits unless they can be utilized. Moreover, to justify the change it is essential that there shall be reasonable prospect of enough work to absorb the cost of the replacement of old equipment and leave a liberal profit.

It should be recalled that the crane requires one operator and a man in the cars if it works at all, but does not need more in the way of a working crew even if production is at a high rate. As a matter of fact, however, two men in the cars are often used in hot weather, but the heat in the cars rather than the volume of work to be done is the governing consideration. The finishing machine requires one operator whether its output is large or small. The material bins also require one operator. Illustrations of this situation might be indefinitely extended but to no very good purpose. The ones cited should make it clear that, of the considerable number of equipment units used on a construction job or about an ordinary plant the larger number are secondary units with surplus capacity having only a minor effect on output or production costs for the job as a whole.



*On a paving job the mixer, the primary unit, sets the pace for the secondary machines*

*Improvements*—Another class of improvements in equipment reduce operating cost; that is, they reduce $O$ in the formula $K = O/P$. Improvements of this character can be utilized whether the equipment involved operates as primary equipment or as secondary equipment. In cases of this kind, where the rate of output is involved, the propriety of exchanging equipment depends on whether the savings are greater than the cost of the exchange. As a rule the margin here is by no means as large as it is where rates of production are involved. Still, many improvements in equipment are quite important enough to justify replacing the old equipment. The gas crane on a paving job, always used as subsidiary equipment, drove out the steam crane because it saved the time of a fireman and eliminated the water wagon and the coal supply. The caterpillar tractor has about driven the horse and the mule off the paving job because it delivers the required amount of pulling power in a more flexible as well as a more economical form.

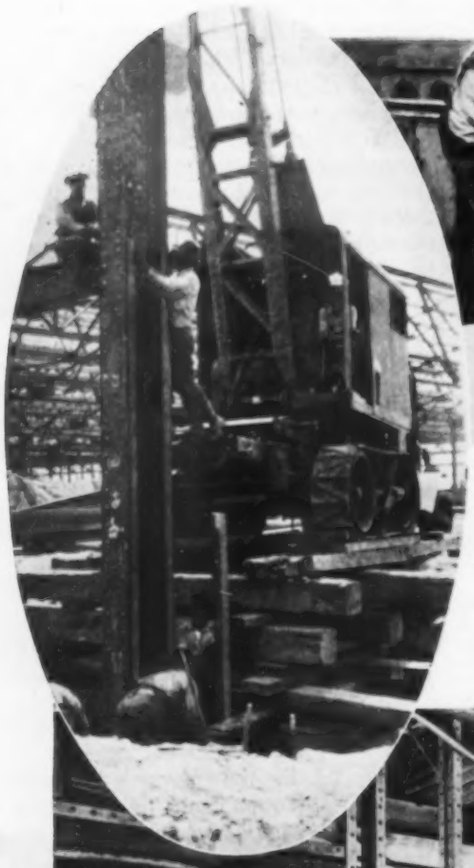
Another angle to the replacement problem is found in those cases where, though showing no direct saving in operating cost, an indirect saving can be shown. The use of the heavy screed finishers for concrete pavement has grown steadily, not because these are cheap machines nor because of the quality of the work done (though this is altogether satisfactory), but because, where they are used, fewer men are required to puddle the concrete and spade along the forms. Savings of this sort are not large in and of themselves, but the man who has taken full advantage of them, either by definitely setting aside old equipment or, when he is in the market for new equipment, by selecting that best suited to the conditions under which his work is done, gradually acquires an important advantage in production cost.

## Summary

Summarizing briefly, this discussion of some of the phases of the problem of when equipment is "worn out," and therefore should be replaced by new, shows that as a rule the cost of owning equipment is higher than is generally supposed, and that the cost of keeping it until there is a loss in dependability or a loss in output capacity may be very high indeed. Under some conditions new types of equipment and new designs make the immediate replacement of old equipment advisable. Still, as matters stand today, the high cost of repairs, of losses in dependability and losses in output capacity, are more important considerations in the general conclusion that, on the whole, important equipment is by no means replaced often enough to keep the cost of having it and using it at a minimum.

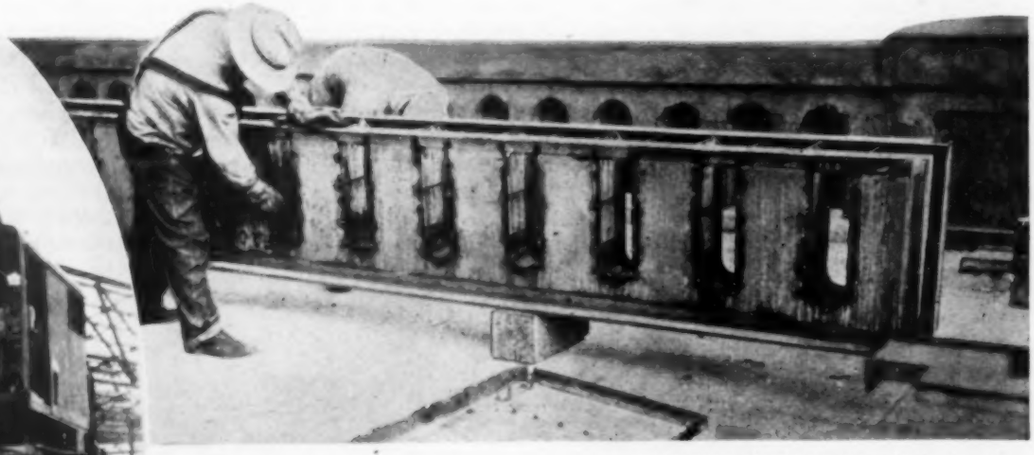
# *Getting Down to* DETAILS

[ Close-up Shots of Jobs Methods and Equipment ]

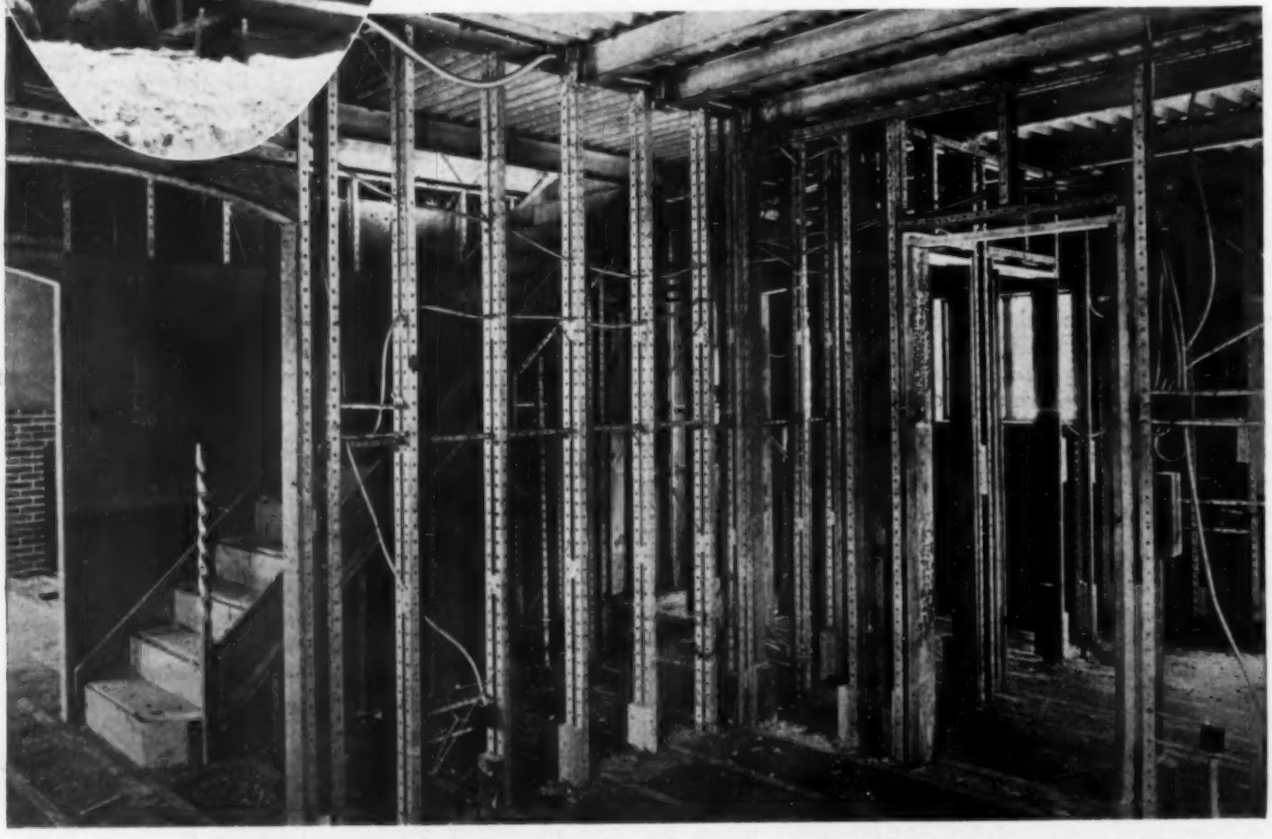


CRIBBING *(left)* provides support for Universal crane used by McClintic-Marshall Co. to set 6-ton column at Ford plant in Long Beach, Calif.

***Photo from***
**M. H. FRINCKE**
***Manager of Erection,***
***McClintic-Marshall Co., Los Angeles***



RAILING FORMS *(above)* designed by Illinois Steel Bridge Co. for Florence bridge across Illinois River, are assembled and stripped with wrenches, long bolts holding parts together. Crown and side plates of arched opening in rail form are cast with molding bead to produce chamfered edge on concrete.



RIGID AND FIREPROOF. Steel frame and studding for 8-room dwelling, developed by Steel Frame House Co., Pittsburgh. View shows method of handling electric wiring and asbestos board on top of floor beams to receive 2-in. poured concrete sub-base of flooring. First floor has nailing strips for hardwood floor covering.

BACKFILLING TRENCH with aid of 20-ft. W-K-M boom and scraper developed for use with Caterpillar tractor. Device can be used also as crane with clamshell bucket.

"GYPSY CREW" of Colorado Highway Department lives on job while patching and repairing concrete roads. Mobile outfit includes truck carrying compressor, tar-pot, concrete mixer, sand, gravel and cement bins and paint spray outfit. Bunkhouse on wheels provides living quarters for the state's road repair nomads. R. H. Higgins is superintendent of maintenance.

*Photo from*
**L. D. BLAUVELT**
*State Highway Engineer of Colorado*

FOR BULK CEMENT. Fleet of International trucks, equipped with special closed bodies (wood sides and hinged metal tops) holding from 35 to 42 bbl., delivers cement from Sandusky mill at York, Pa., to mixer plants of Wiley-Maxon Construction Co. on Columbia-Wrightsville bridge over Susquehanna River, Pennsylvania, described in last month's issue, p. 54.

LONGITUDINAL FLOAT *(right)* proves useful in finishing concrete pavement in Aiken County, South Carolina.

*Photo from*
**C. H. MOOREFIELD**
*State Highway Engineer of South Carolina*

Third of a series of articles on the $325,000,000 construction program for flood control in the Mississippi Valley

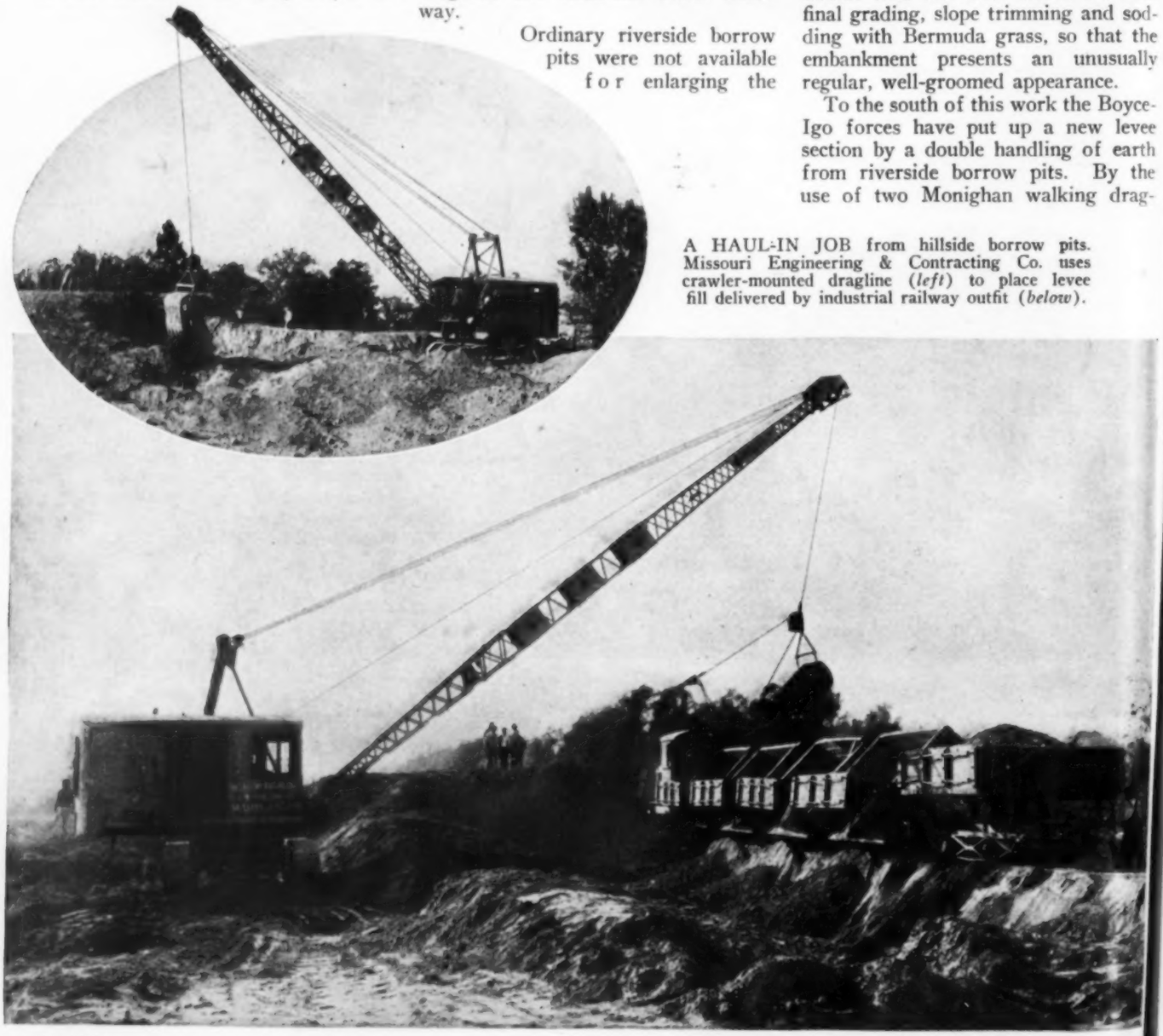
# The Defense Against OLD MAN RIVER-III

By Robert K. Tomlin
Editor of *Construction Methods*

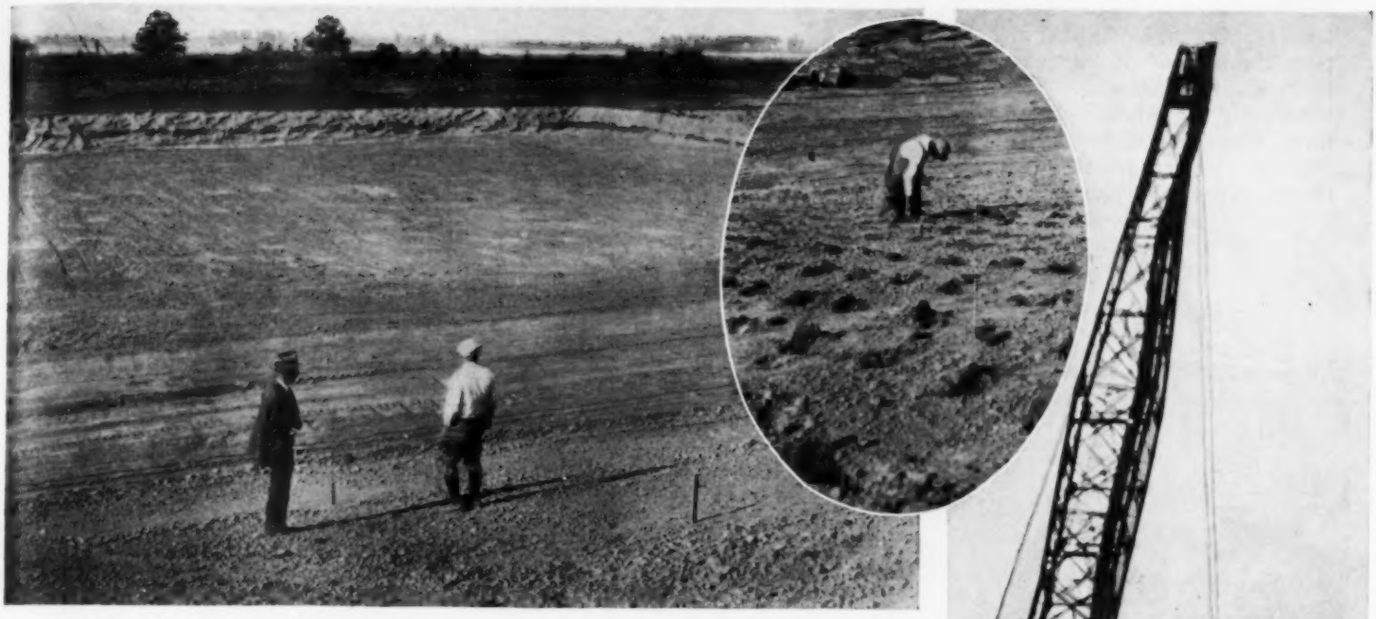
IN THE area on the east bank of the Mississippi River known as the Reelfoot District, just south of Hickman, Ky., three contractors are using three different methods of construction for setting back and enlarging sections of the 17-mile main river levee. On the northerly end the Missouri Engineering & Contracting Co. is using an industrial railway outfit and draglines to place 121,000 cu.yd. of fill at a unit price of 31c. Adjacent to this contract is the dragline job of J. H. Boyce & Sons-R. L. Igoe, involving 465,000 cu.yd. at a unit price of 26c. Further to the south is the big 2,115,000-cu.yd. contract (four sections at 28.4c. and one section at 33c.) which the Sweet-Price Dredging Corporation planted as a hydraulic dredging operation, supplemented by draglines and slack-line tower cableway.

Ordinary riverside borrow pits were not available for enlarging the first mile or so of the Reelfoot levee so that the Missouri Engineering & Contracting Co. had to plan its operations as a haul-in job from hillside borrow pits ½ mile above the upper end of the contract. The transportation of the fill is done in Western side-dump cars by Plymouth gasoline locomotive on narrow-gage track. At the levee the earth is dumped and rehandled to place by a Northwest dragline on crawlers. Particular care has been taken with the final grading, slope trimming and sodding with Bermuda grass, so that the embankment presents an unusually regular, well-groomed appearance.

To the south of this work the Boyce-Igo forces have put up a new levee section by a double handling of earth from riverside borrow pits. By the use of two Monighan walking drag-



A HAUL-IN JOB from hillside borrow pits. Missouri Engineering & Contracting Co. uses crawler-mounted dragline (*left*) to place levee fill delivered by industrial railway outfit (*below*).



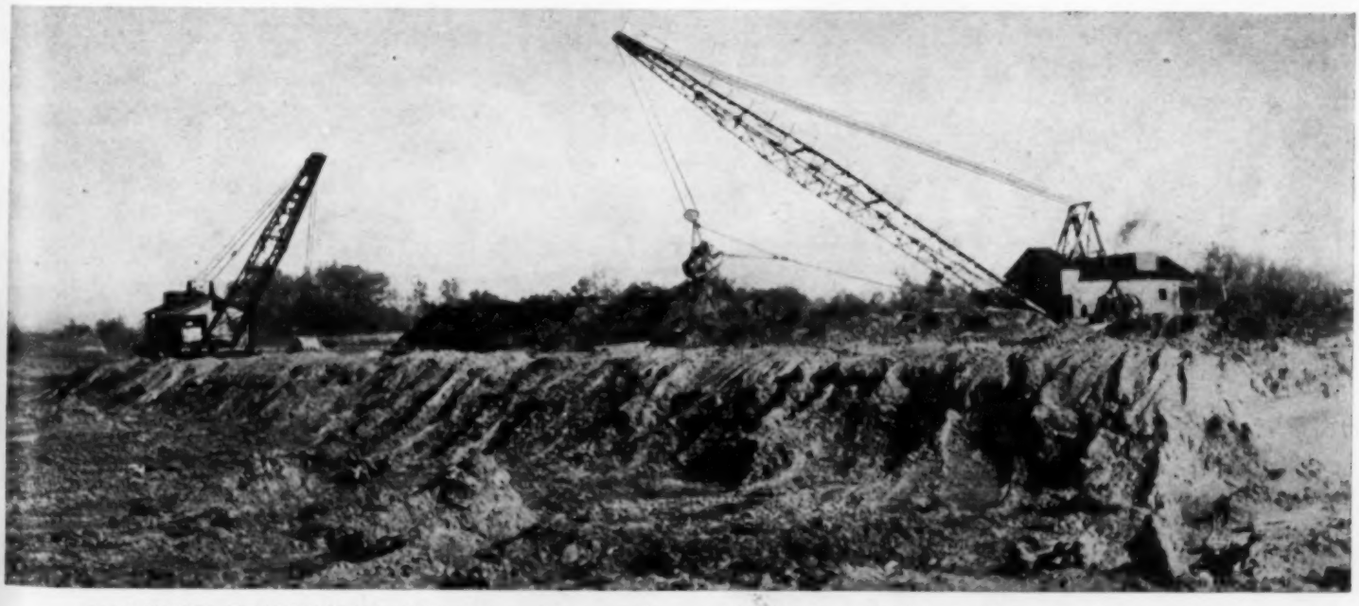
WELL-GROOMED SLOPE and borrow pit on levee built by Boyce-Igo organization, with G. L. Perry, at left, and W. A. Steele, of U. S. Engineer Department, inspecting finished work. SODDING levee (*in oval*) with Bermuda grass.

lines, one feeding the other, it is possible to reach out into the borrow pit for the necessary fill without exceeding specification limits as to slope and depth of the cut. These machines have boom lengths of 135 and 85 ft., respectively. Here, too, an exceptionally uniform slope finish has been secured with fresnos and railroad iron drags. Some interesting tests of the shrinkage of earth in levee fill and borrow pit measurements are in progress on this section of the work.

The Government sodding specifications for completed levee, as carried out on these two contracts, require that the entire surface be planted with 4-in. square living sods of Bermuda or other acceptable grass, placed not more than 2 ft. apart and covered with 1 or 2 in. of earth as directed.

A LONG REACH is obtained by the 135-ft. boom on this walking dragline rehandling material from second dragline.

*Hydraulic Fill* — Departing from traditional levee-building methods the Sweet-Price Dredging Corporation, of Florida, on its large-yardage contract covering more than five miles of the



DRAGLINE TEAMWORK. With two walking machines, one feeding the other, it is possible to reach far out into the borrow pit for the levee fill on the Boyce-Igo job south of Hickman, Ky.

southerly portion of the Reelfoot embankment, decided to place the bulk of the earth by hydraulic fill methods. This work calls for a new set-back levee averaging about 18-ft. high, and enlargement of existing levee at a few points where the old and new lines intersect. The standard B section is used with 10-ft. crown width, 3½ to 1 riverside slope and 6 to 1 landside slope. The old levee is being abandoned and where it is within reach of the new set-back the material from the old fill is employed, where possible, for the new and larger embankment. The new levee line is roughly parallel to the old one and the distance between them ranges from about 400 to 750 ft.

HYDRAULIC FILL on Sweet-Price contract discharges into pool between retaining dikes on Reelfoot levee. DREDGE (*left*) has cut through river bank and is kept afloat in long borrow pit by water pumped from Mississippi River.

In its essential features the hydraulic fill method of levee construction, as used by the Sweet-Price organization, requires as the first operation the construction of a pair of parallel retaining dikes one near the riverside and one near the landside toe of the new levee.

The function of these dikes, supplemented by cross dikes built at suitable intervals, is to form the sides of a long pool into which material for the fill is pumped by a hydraulic dredge. It is not possible, of course, to carry the embankment to full height by this method. The lateral dikes are built to a height sufficient to retain about 10 ft. of the fill forming the lower portion of the levee which contains the bulk of the yardage of the section. The final operation consists in topping off the embankment and grading the side slopes with borrow brought in by dragline or slack-line tower cableway machine. Before this work can be undertaken, however, it is necessary to allow ample time for the water to drain from the material pumped in by the hydraulic dredge.

On the Sweet-Price job three hydraulic dredges are in service, one 16-in. and two 12-in. units, all operated by Diesel-electric power. The delivery of the dredges had to be timed to coincide with a high stage of the Mississippi River so that they could cut their way through the bank and be floated to their inshore borrow pits with a minimum of excavation. As the river level subsided, following the spring flood stage, provision was made for keeping the dredges afloat by constantly pumping from the river into the borrow pits where they operated. The larger of the dredging units has a draft of from 6 to 7 ft.

RETAINING DIKES (*below*) are built by dragline, forming pool to receive hydraulic fill from dredge. CAMP (*right*) of Sweet-Price Dredging Corporation.

Draglines of various sizes are used

extensively on the work to supplement the hydraulic dredging operations. At the time the work was visited there were seven of these units on the job, comprising three Page machines with 60-70-ft. booms and 2½-yd. buckets; two 1-yd. Link-Belts with 50-ft. booms; one 1¼-yd. P.&H., with 50-ft. boom; and one 3½-yd. Bucyrus with 115-ft. boom. A special detail of the Page machine is a new double-crawler mounting. In addition to a pair of main crawlers 28-in. wide and about 20 ft. long there is a second set of auxiliary crawlers of the same width and 9 ft. long, thus offering an exceptionally large bearing area to support the machine on the treacherous, muddy ground so prevalent in the Mississippi Valley.

The smaller draglines were employed first to cut a so-called muck ditch or inspection trench 6 ft. wide and 6 ft. deep along the levee center line to disclose the character of the foundation material and indicate the presence of stumps to be removed.

Next came excavation by dragline for the retaining dikes near the toes of the levee slopes to form the settling pool for the dredged fill. These dikes were built to heights of 10 ft. or thereabouts and cross dikes were placed so as to form pools 1,000 to 1,500 ft. long. The remaining major service of the draglines was to place the top section of fill in the embankment, above the portion pumped in by the dredges, and to finish off and trim the side slopes to specified slopes.

Another piece of equipment installed to place material in the upper portions of levee section is a Sauerman slackline tower cableway with 6-yd. Crescent bottomless bucket. This outfit, electrically operated, has a head tower which is mounted on and moves along the top of the hydraulic fill, after the earth has dried out sufficiently to support the weight of the machine. The tail tower is a floating unit, mounted on a steel barge in the borrow pit that contains the dredge. This barge, in addition, carries a 360-hp., 440-volt a.c. Diesel-electric power plant which operates the motors controlling the tower-cableway excavating operations.

The cableway span is about 500 ft.

DRYING OUT. This fill, forming lower portion of levee section, has been placed hydraulically between retaining dikes at each side.

The dredges are powered with Diesel-electric units. The larger (16-in.) dredge has a 360-hp. engine for operating the centrifugal pumping equipment and a 180-hp. engine for the electric generator which serves the revolving cutter, swinging arm and electric controls. As the dredge, following the lowering of the flood stage of the Mississippi on which it was delivered to the job, now operates inshore above water level in the river, it is necessary to raise water into the borrow pit by a 12-in. gasoline-operated pump to keep the unit afloat. For the two other (12-in.) dredges pairs of 8-in. pumps keep the borrow pits flooded.

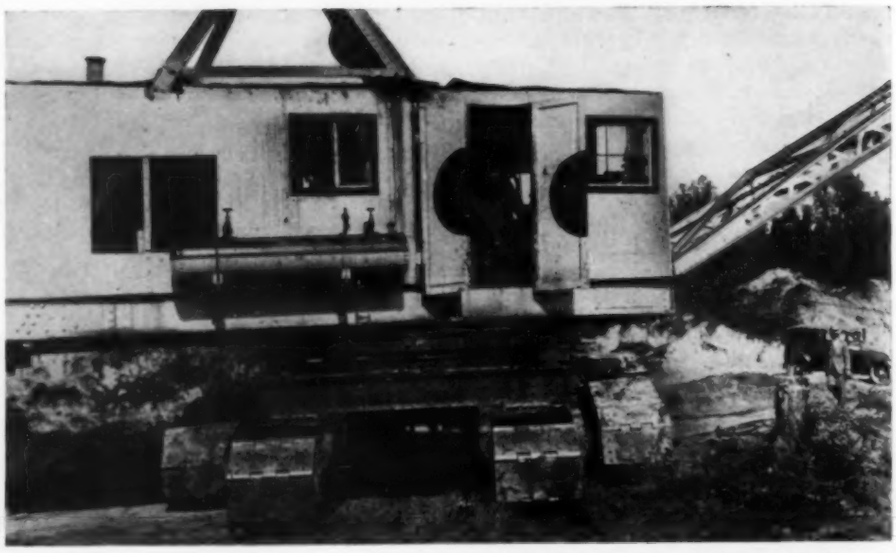
The stream of dredged material, as

SLACKLINE CABLEWAY, with tail tower (*left*) on barge in borrow pit and head tower on levee line, operates 6-yd. bottomless bucket (*right*) to top off hydraulic fill placed by dredges to height of 10 ft. or thereabouts.

it discharges into the settling pool to form the base of the levee between the retaining dikes, contains about 30 per cent solids. Some of this material is lost, however, with the water that drains from the discharge end of the pool back into the borrow pit. One of the photos on p. 47 shows the appearance of the hydraulic fill after it has begun to dry out. While optimistic forecasts had been made for the output and economy of the hydraulic method of placing fill on the Reelfoot levee, progress at the time the job was visited was considerably behind scheduled requirements. It must be remembered, however, that this method of earth handling as applied to levee construction is comparatively new and that construction difficulties are to be expected in the early stages of such pioneer operations.

With regard to dredged fill, it should be kept in mind that the bane of levee building by other than hydraulic methods has been wet borrow pits. With the dredge this objection becomes an advantage and work need not be held up by rain or high river stages. Another important point in favor of the hydraulic fill is that the contractor is not required to place excess yardage in the embankment to allow for settlement and shrinkage. All of the material placed is net, pay dirt, as contrasted with the 25 per cent excess yardage required by the Government specifications for levee built by dragline, 20 per cent for animal and wagon work and 15 per cent for tractor, scraper and wagon fill. With the dredges, too, a smaller labor force is required.

Disadvantages of the hydraulic method for levee building are the unwieldy, cumbersome floating equipment required and its delivery to and removal from the job; the necessity of pumping into borrow pits to keep the dredges afloat; the loss of material by drainage back into the borrow pit; and the time involved in drying out the saturated fill between the retaining dikes before the levee section can be topped off and finished. It is still too early to attempt to pass final judgment on the place hydraulic dredging occupies among levee building methods. At present it has staunch advocates and equally positive and, perhaps, more numerous unbelievers.



AUXILIARY CRAWLERS, affording extra bearing area, prevent this Page dragline from bogging down in muddy ground.

Several other contracts for Mississippi levee building are being handled with dredging equipment and will be illustrated in forthcoming articles in this series. These include not only hydraulic dredges of the type employed on the Sweet-Price job, described above, but also a California type dredge with 240-ft. boom and 6-yd. bucket.

The work described in the present article is in the first field area of the Memphis District of the U. S. Engineer Department, Lieut-Col. F. B. Wilby, district engineer, and T. T. Knappen, area engineer.

* * *

***NEXT MONTH:*** *Casting and sinking large slabs of concrete to form revetment for bank and channel protection along the Mississippi River.*

A LONG-BOOM DRAGLINE supplements the hydraulic fill operations for levee building on the Sweet-Price job. BUCKET (*in oval*) has 3½-yd. capacity.

# JOB ODDITIES

**A Monthly Page of Unusual Features of Construction**

A BROKEN THUMB meant little in the life of this colossal 120,000-lb. cast-iron statue (*left*) when oxy-acetylene welders got on the job. They fashioned a new copper thumb 30 in. long and 16 in. in diameter and bronze-welded it in place without difficulty. The statue, representing Vulcan, was set up at the St. Louis Exposition in 1904 to typify the great mineral resources of Alabama and now stands in the fairgrounds at Birmingham.

©P.44.

SILENT POLICEMAN directs travelers to Schlossplatz. This road sign, located near Warmbrun, Silesia, is one among many curious indicators to be found along the highways of Central Europe.

BUILT TO LAST (*below.*) Chinese workmen erected this structure which has served many generations of pedestrians. It is located in the state of Tongking, French Indo-China.

©P.44.

HANGING BY A THREAD. With aid of wire cable and trolley sling this constructor performs human spider act to reach anchorage of Kaibab Trail suspension bridge across Colorado River in Grand Canyon National Park described on pp. 32-34.

©Herbert

A THREE-LEVEL CROSSING in Richmond, Va., said to be the only one of its kind in America.

# Tractor Drivers Operate Mechanical Earth-Moving Equipment

## *Machines Handle Large Quantities With Minimum of Labor on Railroad Grading Job*

DUMP CART *(below)* of 16-yd. capacity, mounted on broad wheels, discharges load through tail gate controlled by tractor driver.

7-YD. SCRAPER, operated from tractor spreads load on fill across marshy tideland. *(At right)* CRAWLER MOUNTING also is used with 16-yd. dump cart, which is hauling load estimated to contain 21 cu.yd.

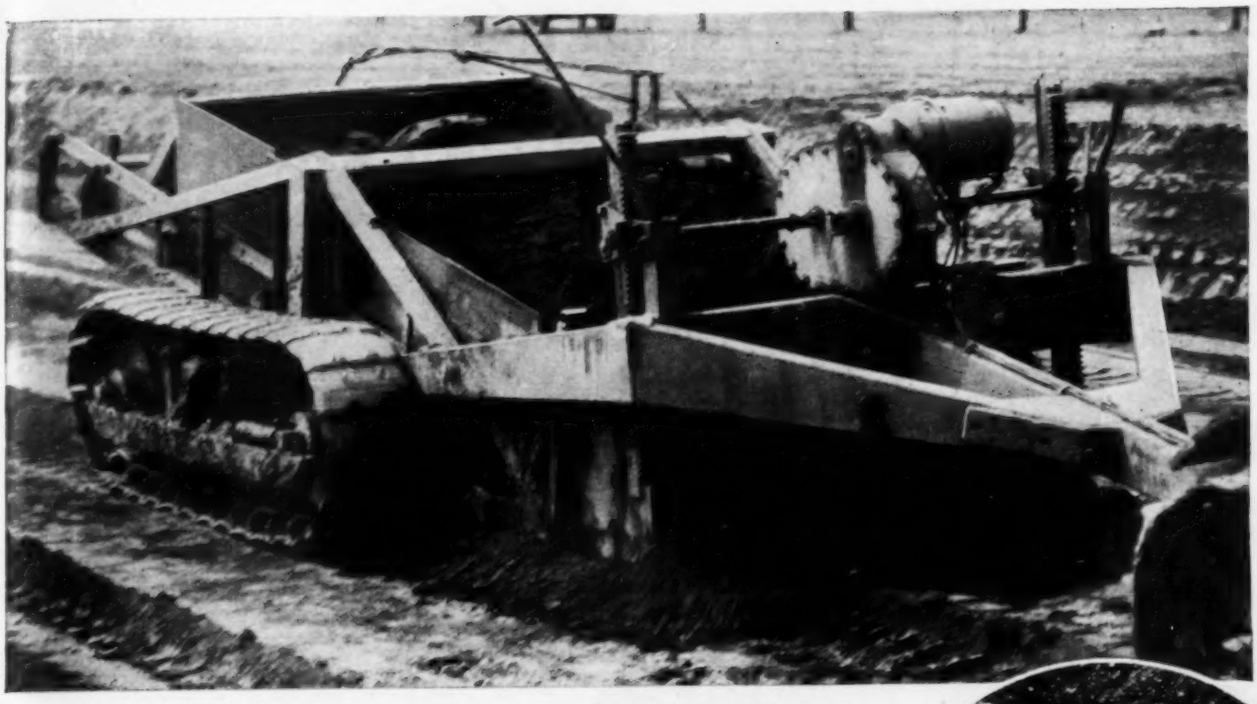
EMPLOYING some unusual earth-moving equipment of his own invention, R. G. LeTourneau, of Stockton, Calif., rapidly completed about 4½ miles of grading to provide the north approach for the new Southern Pacific railroad bridge now under construction across Suisun Bay. The contract calls for moving about 500,000 cu.yd. of material mainly earth. The roadbed to be provided is 20 ft. wide on fills and 24 ft. wide in cuts. Maximum depth of cut is 68 ft. and the highest fill is 60 ft.

Material was excavated with a 2-yd. Bucyrus-Erie Diesel shovel and transported in tractor-drawn dump carts of the contractor's own design to the fill, where it was deposited in layers. No sprinkling was done on the fill, the effect of the heavy equipment traveling on the fresh fill being sufficient to compact it.

The most interesting feature of the job was the equipment devised and perfected by the contractor himself. Dump carts of 16-cu.yd. capacity, shown in the accompanying illustrations, are of unique design. At the top the body is 7 ft. 8 in. x 5 ft. 4 in., the sides sloping sharply to the tailgate opening at the rear. This gate is tripped from the tractor driver's seat, distributing the load as the tractor moves forward, and is so balanced that it swings shut when the material has been discharged. As shown in the pictures, the dump carts are equipped either with crawler treads or with two large wheels with rims 30-in. wide. In either case the heavy load is an aid in compacting the fill.

The scarifier, another of the contractor's own developments, consists of three heavy standards in a massive steel body. The standards are arranged to be set at any depth from the tractor driver's seat.

The electrically operated earth loader



TELESCOPING EARTH LOADER expands to 16-yd. capacity when pulled forward with the blade set in the ground. For unloading, the blade is raised and the body is moved forward by electric power to discharge the load gradually at the front.

was probably the most unusual piece of equipment on this job. A telescoping body is mounted on crawler treads and is controlled by means of electric motors from the tractor driver's seat. The blade is lowered by motor to the required depth for filling, and the forward motion loads the scraper. When full and ready for dumping, the blade is raised to give proper depth of spread and the operating machinery moves the body forward to discharge the load from the front end. Power is furnished by an electric generator with belt take-off from the tractor engine, and this power is utilized in electric motors placed on the loader, eliminating the use of manual controls. Six Caterpillar 60 tractors haul the LeTourneau equipment on this job.

Mechanical control of all these types of earth-moving equipment by the tractor driver is one of the most noteworthy features of the designs. No extra men are needed in loading, dumping, or adjusting to various depths. The great size and weight of the equipment is used to advantage, and the bulk of the machines is not allowed to interfere with their ease of operation.

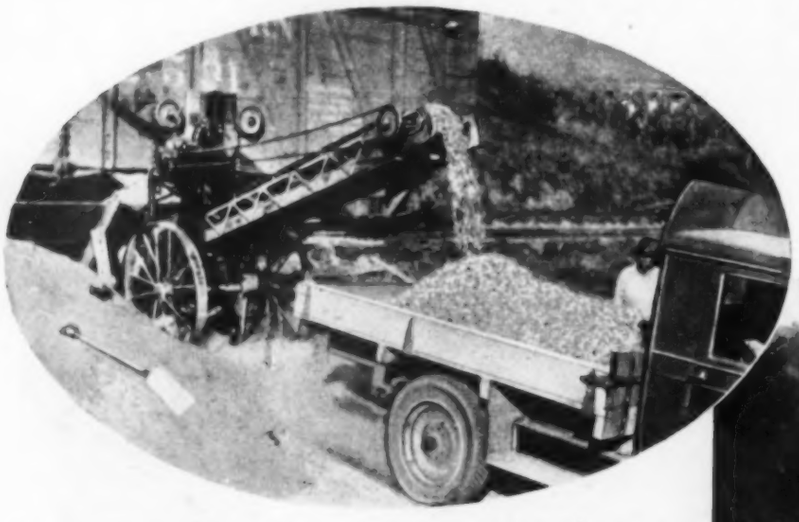
The work is being done under contract with the Southern Pacific Co. Mr. LeTourneau is personally supervising the work.

SCARIFIER *(above)* weighing approximately 3 tons, prepares a cut for self-loading scrapers. DIESEL SHOVEL *(left)* with 2-yd. dipper loads 16-yd. car pulled by 10-ton tractor. Four carts handle 3,600 yd. in 22 hours.

# LOW-COST SURFACING for Light Traffic Roads

## Three Bituminous Treatments Give North Carolina All-Weather Surface on Secondary Highways for $3,100 a Mile.

BITUMINOUS surface treatment of low-cost roads has become one of the major activities of the North Carolina state highway department. With most of the primary roads of the state highway system paved, the department is following a policy of providing on its second- and third-class roads a dustless, smooth-riding, all-weather surface that is non-skidding. Six seasons of experience have demonstrated that the present methods used in the bituminous-surface treatment of top-soil, sand-clay and gravel roads give such results at reasonable cost. At the same time, the expense of maintaining roads of these types is reduced from an average of around $500 to under $350 per mile per year after they have been treated.



PORTABLE GAS-ENGINE CONVEYOR (*above*) loads trucks with chips delivered to railroad siding in hopper-bottom cars. SPREADING LIMESTONE CHIPS (*right*) on seal coat under traffic.

Experience shows that one of the most important steps in work of this sort is first to be certain that the surface to be treated will provide an adequate foundation. Experience also shows that the salvage of badly-worn surfacing by patching the thin spots and holes just prior to treatment is almost sure to cause trouble. Too much machining immediately in advance of the application of the tar or asphalt has invariably resulted in failure. Surfacing that has been maintained in such manner as to form strata of unbonded material also has been found fatal to good results. Surplus of clay in sand-clay and gravel roads is another condition which must be overcome.

The best foundation for surface treatment is a road surfacing that has been down long enough to have been well compacted and well bonded the full width of the road by traffic. If treatment is undertaken too soon after the surfacing has been done there are likely to be soft edges that will be hard to fix.

Based on these facts, the general policy of the department is to recondition thoroughly, or to resurface entirely, roads that are to be treated with bituminous material. Wherever possible, the surfacing is done the season previous to the treatment work, or at least several months prior.

Having met this condition, the next step is to sweep the surface free of loose dirt and fine sand. Then a priming coat of hot tar is sprayed on the clean surface from a motor-truck-mounted tank distributor.

The standard application of tar for the priming coat is ⅓ gal. per square yard and is applied 2 to 5 days prior to placing the seal coat. Nothing is put on it to absorb any slight excess of the tar. Wherever practicable or necessary traffic is diverted until the seal coat is placed and covered.

While waiting for the priming coat to penetrate the road surface, all depressions are filled with a cold-patch mixture of tar and stone in order to avoid irregularities in the work.

The next step is the application of the seal coat of bituminous material with the motor-truck distributor at the rate of ⅓ gal. per square yard of surface. Crushed limestone or granite chips, free from dust and thoroughly clean, are then spread over this seal coat to a depth that will just blot up the surplus bituminous material. Limestone chips are preferable for this work.

Numerous experiences have proved that fine sand will not do for the blotter coating. Very coarse sand and fine gravel may be used, but much better results have been obtained with clean crushed-stone chips. These are required to pass a 1-in. ring and be retained on a ring having a ¼-in. opening.

In most cases the chips are spread by hand with shovels from flat-bottom

THREE-SECTION FLAT, STEEL BROOM, dragged by truck, respreads limestone chips where necessary.

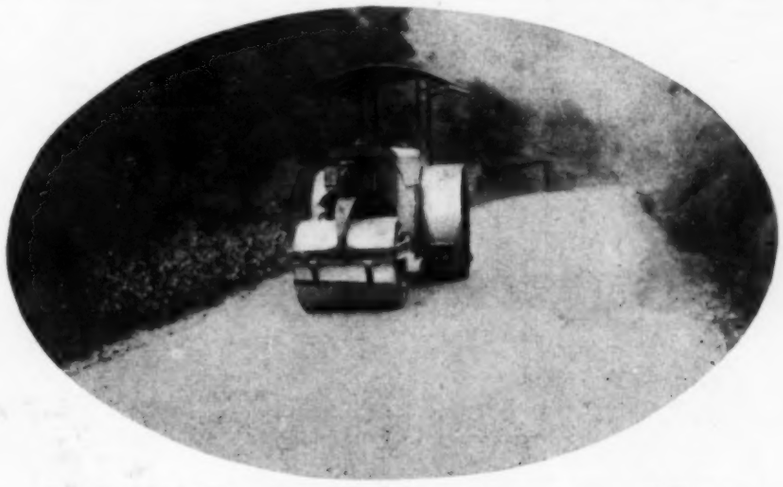
non-dumping 1-ton trucks. A sand distributor working behind a truck has been used to advantage for this purpose.

For practically all jobs the chips are delivered to the most convenient railroad siding in hopper-bottom cars. Whenever practicable, the trucks haul directly from the cars to the point where the chips are being spread. Cases arise where it is desirable to stock-pile the chips along the job at 2-mile intervals. Short gas-engine portable belt conveyors have been found very satisfactory and economical for loading the trucks.

The foremen on this class of work have acquired a know-how until their crews spread by hand with remarkable uniformity. They also very closely approximate the amount of chips required to blot up the surplus bituminous material. Variations in temperature and humidity conditions require differing amounts of the chips to accomplish this result. When working during a hot, dry spell there is usually but little bleeding after the job is done. On the other hand, if the seal coat is placed in cool weather, there is likely to be some surplus bituminous material show up on the surface here and there when the temperature rises. These spots are caught later by the surfacing crew, or by the maintenance gang, if the weather change comes some time after the work is finished. After the chips are spread, what at first may appear to be a surplus of them is compacted into the seal coat by road rollers, broom drags and traffic. In some cases it is desirable to loosen some of the chips and spread them further by means of a three-section flat steel broom dragged behind a truck.

A third application of bituminous material is made at a considerable period after the completion of the work as described. If the seal coat and chips have been placed early in the season, the third application may be put on near the end of that season. Usually it is applied the following year.

This third application consists of about ¼ gal. of bituminous material per square yard of surface treated. Chips, similarly compacted and worked into the surface, are used to blot up the surplus. This application fills the voids in the previous application. It also freshens up and strengthens any weak spots that may have developed. It further adds to the total depth of the surface treatment to an extent that provides the necessary thickness and the amount of binder that are required to give long life and low maintenance costs to the completed work.



ROAD ROLLERS compact surplus chips into seal coat. Rolling is continued until all free chips are bedded.

H. E. NOELL, engineer of the Ninth District, examines a surface treatment soon after seal coat and stone chips have been compacted.

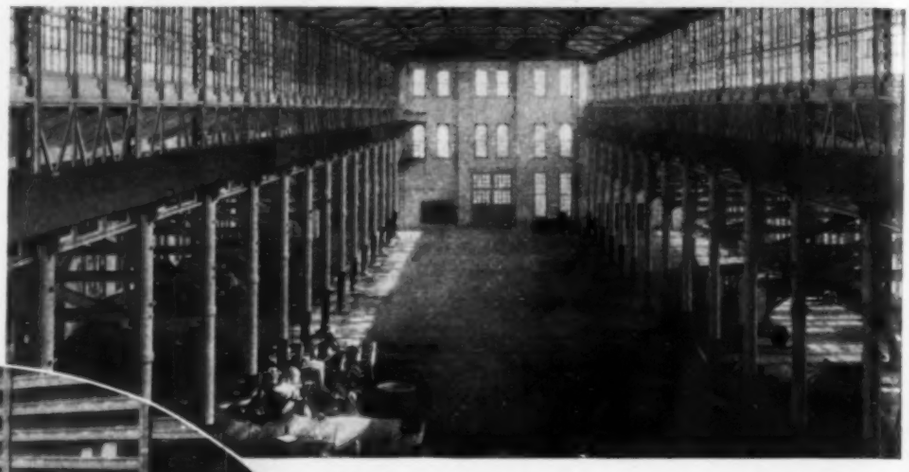
The cost of this surface-treatment work has averaged about $2,100 per mile on 18-ft. widths. This cost includes the priming and seal bituminous coatings with the chips required. It does not include any expense of resurfacing or reconditioning the surface of the road prior to treatment. The third bituminous application, 6 months later or following season, averages about $1,000 per mile.

John D. Waldrop, state highway engineer of North Carolina, personally has had direct charge in former positions in the department of the development of the methods described. W. D. Somervell is assistant state highway engineer and J. B. Clingman is engineer in charge of bituminous work.

# USED EQUIPMENT REBUILT

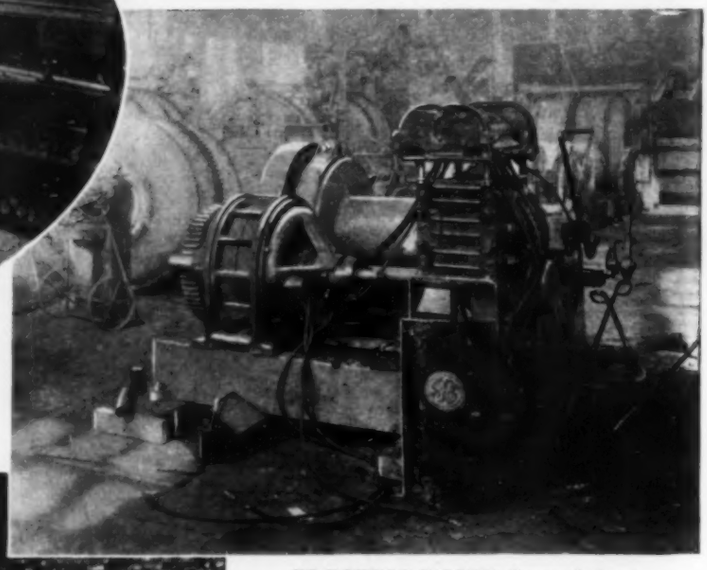
## *to Prolong Useful Life on the Construction Job*

TO PROLONG the useful life of construction plant the Equipment Corporation of America, with headquarters in Chicago and branches in Philadelphia and Pittsburgh, has developed well organized facilities for rebuilding used machinery at a newly remodeled and enlarged plant. The three main objectives of its service as outlined by H. M. Capron, president, are (1) to make immediately available from stock at strategically located points a full line of equipment; (2) to advise regarding the proper selection of equipment for specific jobs; and (3) to provide a market for contractor's surplus equipment.

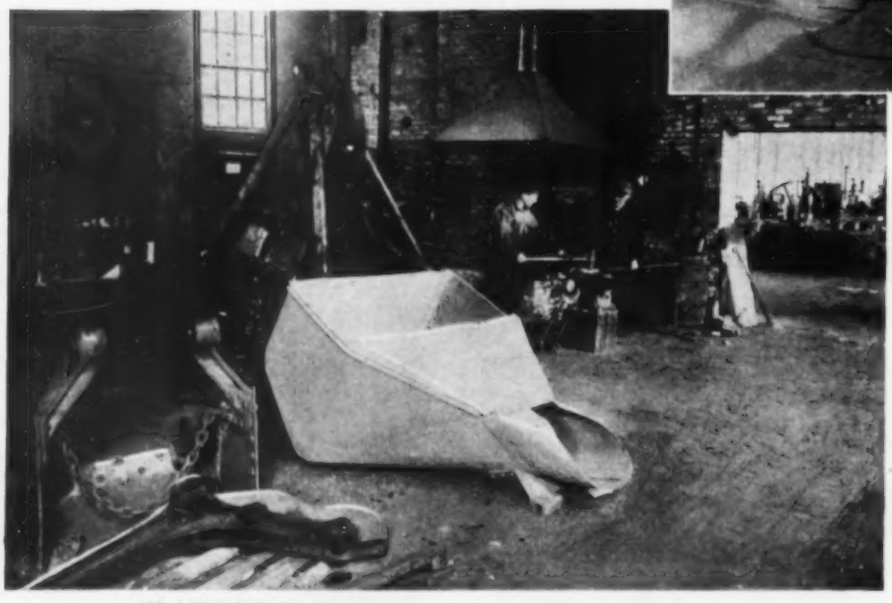


PLANT at Chicago newly constructed and equipped to rebuild used construction equipment.

TOOL ROOM (*above*) stocked for the demands of the mechanics in the machine shop, blacksmith shop and elsewhere about the plant.



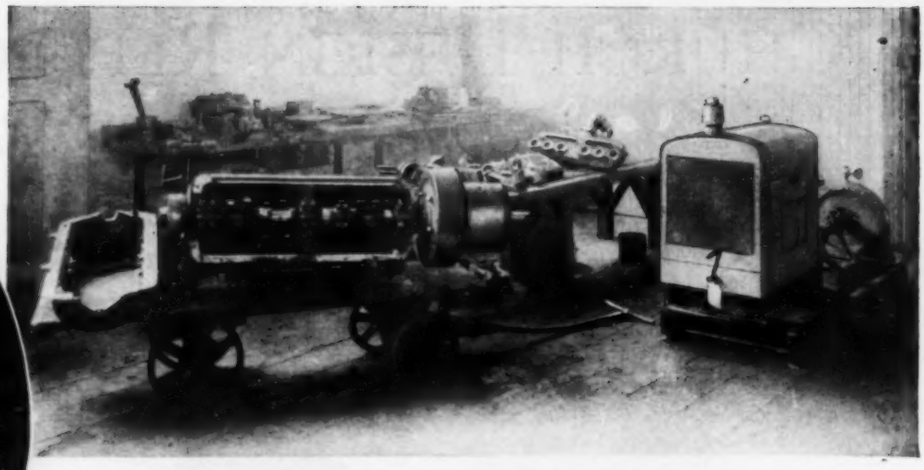
ELECTRIC HOIST dismantled prior to rebuilding operations.



BLACKSMITH SHOP showing clamshell buckets and mixer charging skip under repair.

The accompanying photographs illustrate some of the company's plant facilities for reconditioning the used equipment which it purchases. Derricks, cranes, machine shops, blacksmith shops and warehouses are manned with a corps of mechanics who dismantle the used machines received, rebuild and test them before they are sent out to the job. Among the large jobs from which the organization has obtained equipment for rebuilding are

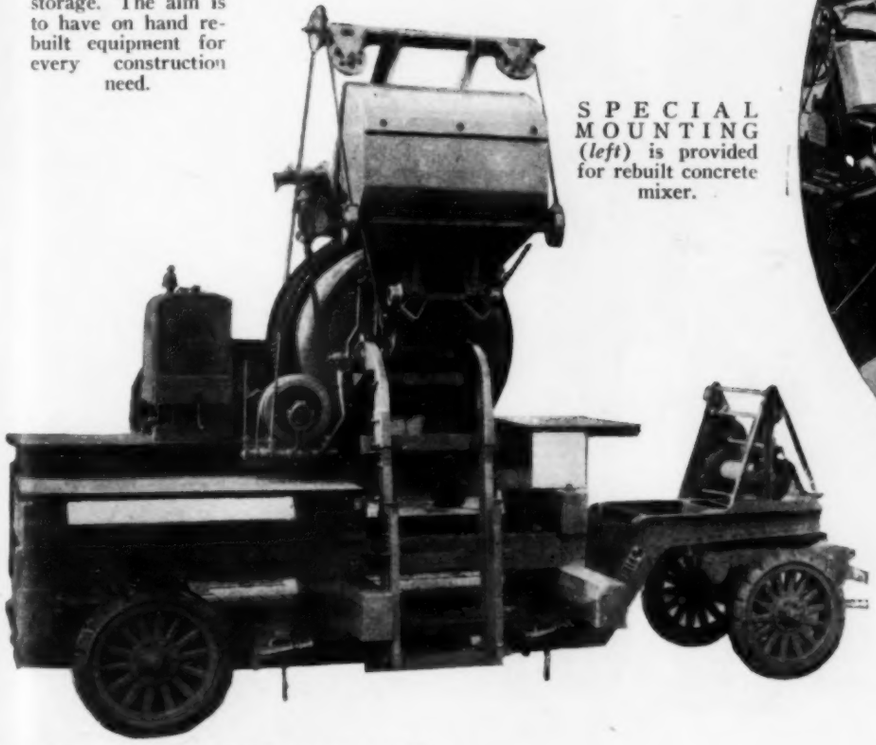
H. M. CAPRON, president of the Equipment Corporation of America.

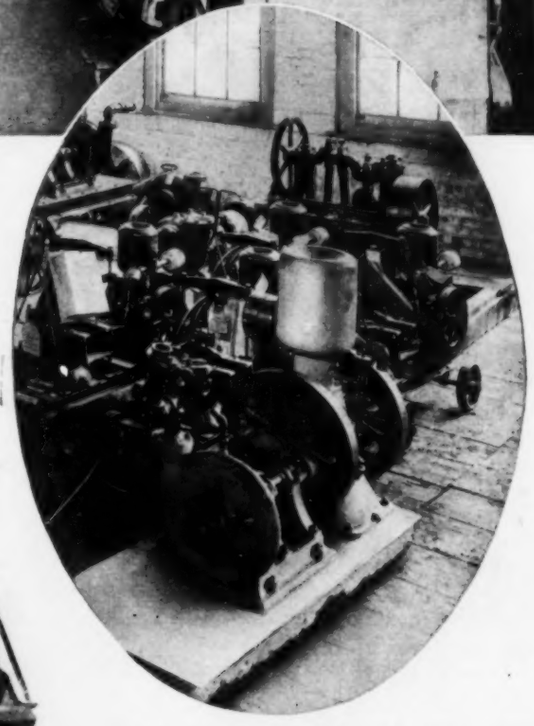


GASOLINE ENGINE knocked down for thorough overhauling.

VARIETY (*above*) marks the stock in storage. The aim is to have on hand rebuilt equipment for every construction need.

SPECIAL MOUNTING (*left*) is provided for rebuilt concrete mixer.





PUMPS of all kinds and sizes go through rebuilding process.

the Hog Island shipyard, the Conowingo (Md.) power development, the Muscle Shoals (Ala.) dam and power plant, and the Hopewell (Va.) job of the DuPont Engineering Co.

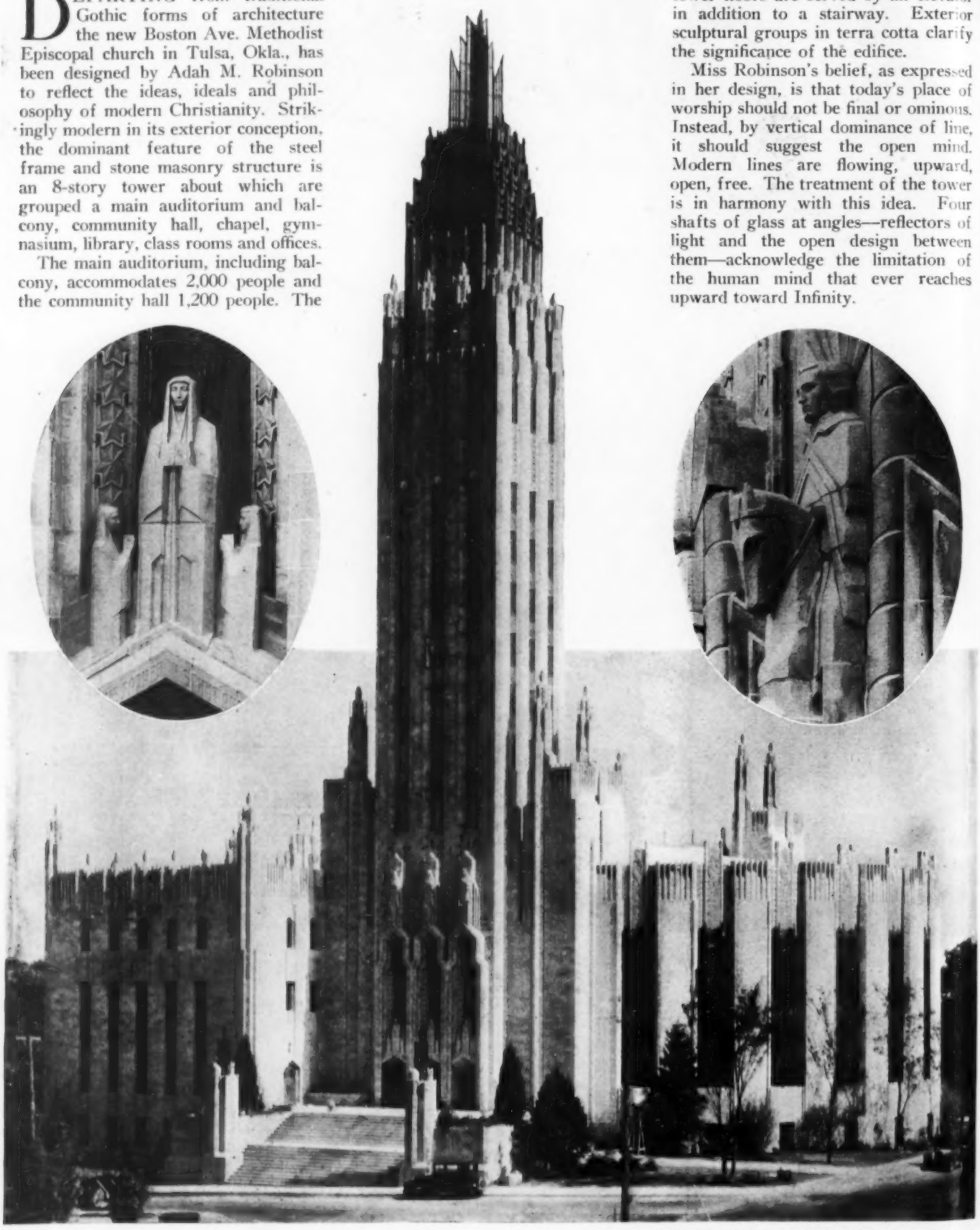
# CHURCH DESIGN REFLECTS IDEALS

## *of Modern Spiritual Thought*

DEPARTING from traditional Gothic forms of architecture the new Boston Ave. Methodist Episcopal church in Tulsa, Okla., has been designed by Adah M. Robinson to reflect the ideas, ideals and philosophy of modern Christianity. Strikingly modern in its exterior conception, the dominant feature of the steel frame and stone masonry structure is an 8-story tower about which are grouped a main auditorium and balcony, community hall, chapel, gymnasium, library, class rooms and offices.

The main auditorium, including balcony, accommodates 2,000 people and the community hall 1,200 people. The tower floors are served by an elevator in addition to a stairway. Exterior sculptural groups in terra cotta clarify the significance of the edifice.

Miss Robinson's belief, as expressed in her design, is that today's place of worship should not be final or ominous. Instead, by vertical dominance of line, it should suggest the open mind. Modern lines are flowing, upward, open, free. The treatment of the tower is in harmony with this idea. Four shafts of glass at angles—reflectors of light and the open design between them—acknowledge the limitation of the human mind that ever reaches upward toward Infinity.



# Present and Accounted For—

## A Page of Personalities

©Wide World

MRS. LILLIAN GILBRETH, president of Gilbreth, Inc., of Montclair, N. J., and mother of eleven children was the only woman delegate to the recent World's Engineering Congress at Tokyo.

©Blank & Stoller

EDWARD GAGEL *(above)*, chief engineer of the New York, New Haven & Hartford Railroad for the last sixteen years, recently retired from active service after a railroad career of 56 years, 47 of which were spent in the employ of the New Haven road.

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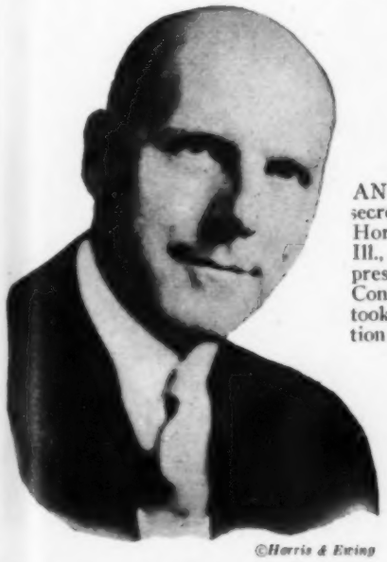
R. L. PEARSON *(right)*, new chief engineer of the New York, New Haven & Hartford Railroad, appointed to succeed Edward Gagel.



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ANTON E. HORST *(left)*, secretary-treasurer of Henry W. Horst & Co., of Rock Island, Ill., and Philadelphia, is new president of Associated General Contractors of America. He took office at the annual convention of the organization last month.

GEORGE B. WALBRIDGE, vice-president of Walbridge-Aldinger Co., of Detroit, Mich., is serving as general manager of the Associated General Contractors of America, filling the vacancy caused by the recent death of D. A. Garber

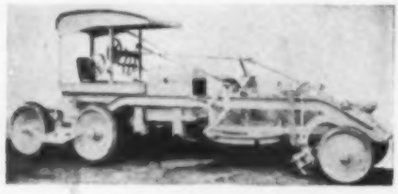
# NEW EQUIPMENT ON THE JOB

## Ditcher Cuts Sloping Banks

A wheel-type ditcher, built in five sizes and designed for use in digging open-type drainage and irrigation ditches, is a recent product of the Austin Machinery Corporation, Muskegon, Mich. The standard machine can slope banks ½ to 1 or 1 to 1 with depth of cut ranging from 4 to 6 ft. Bottom widths are from 18 to 60 in.; top cuts from 8 ft. 6 in. to 16 ft. The conveyor can be shifted to deposit spoil on either side of the ditch.

## Maintainer for Small Jobs

A motor maintainer for jobs where funds and equipment are limited has been developed by the Western Wheeled Scraper Co. of Aurora, Ill.



This machine has a power unit of its own, a standard gear shift with three forward and one reverse speeds and a four-wheel drive. It can be equipped with a scarifier and converted into a power drag.

## Shovel With Low Clearance

A machine of interest to the material handling industry is the new Trackson

shovel introduced at the Road Show last month by the Trackson Co. of Milwaukee. Its outstanding features are strength of construction, a sharp cutting bucket edge for hardpan digging, simplicity of operation, interchangeability with bulldozer and crane and low overhead clearance. It may be mounted on a crawler or wheel tractor.

## New Tractor-Dump Wagon

A combination tractor and dump wagon, known as the Dumptor, has been added to the line of machines handled by the Koehring Division of the National Equipment Corporation, Milwaukee, Wis. It is powered by twin 4-cylinder engines which enable it

to travel without steering clutches in any kind of ground. It has four speeds forward, 1, 2, 3¾ and 5¼ miles per hour and one reverse, 1⅛ miles per hour. The struck level capacity of the body is 5-yd. with an actual operating capacity of 6½ yd.

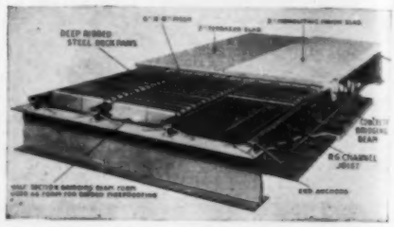
## Becomes Operating Organization

The National Equipment Corporation, a consolidation of the Koehring and T. L. Smith companies of Milwaukee, the Insley Manufacturing Co. of Indianapolis, the Parsons Co. of Newton, Iowa, and the Kwik-Mix Concrete Mixer Co. of Port Washington, Wis., became an operating company Jan. 1. Philip A. Koehring is president and general manager with headquarters in Milwaukee.

Sales, service, advertising and accounting departments have been centralized to render a more efficient service to customers and to effect economies in operation and overhead.

## Steel Deck Floor Construction

To eliminate wasteful dead weight in building construction has been the aim of the Rivet-Grip Steel Co. of Cleveland in manufacturing its steel

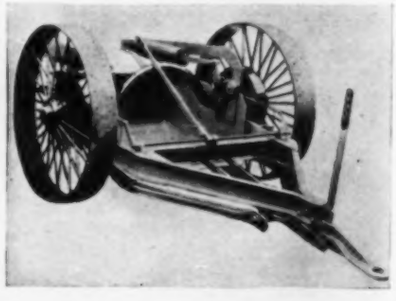


deck floor construction. This construction weighs 6 lb. per square foot and all component parts are rigidly interlocked, thus enabling builders to produce a high strength slab and a hard wearing surface.

## A 2-Yd. Wheeled Scoop

For excavating, transporting and spreading earth on hauls up to and exceeding 2,000 ft., the W. A. Riddell Co., Bucyrus, Ohio, has developed a new 2-yd. scoop. It is carried by two 66-in. Timken bearing mounted land wheels with 10-in. rims and equipped with clutch housings containing clutches of the progressive internal expanding band type. A lever and a latch are the controlling mediums for placing the scoop in cutting, loading and dumping positions.

Scoops are operated in trains of two



or more, depending upon the power of the tractor, the ordinary 10-ton type machine handling three of the 2-yd. scoops without difficulty. The scoop bowl is so mounted within a frame and supported from the axle that the loading power is taken direct from the tractor drawbar to the bowl cutting lip by means of heavy tubular drawbars. No stress or strain is placed upon the frame.

LORAIN 75
Endorsed by
Prominent
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at the
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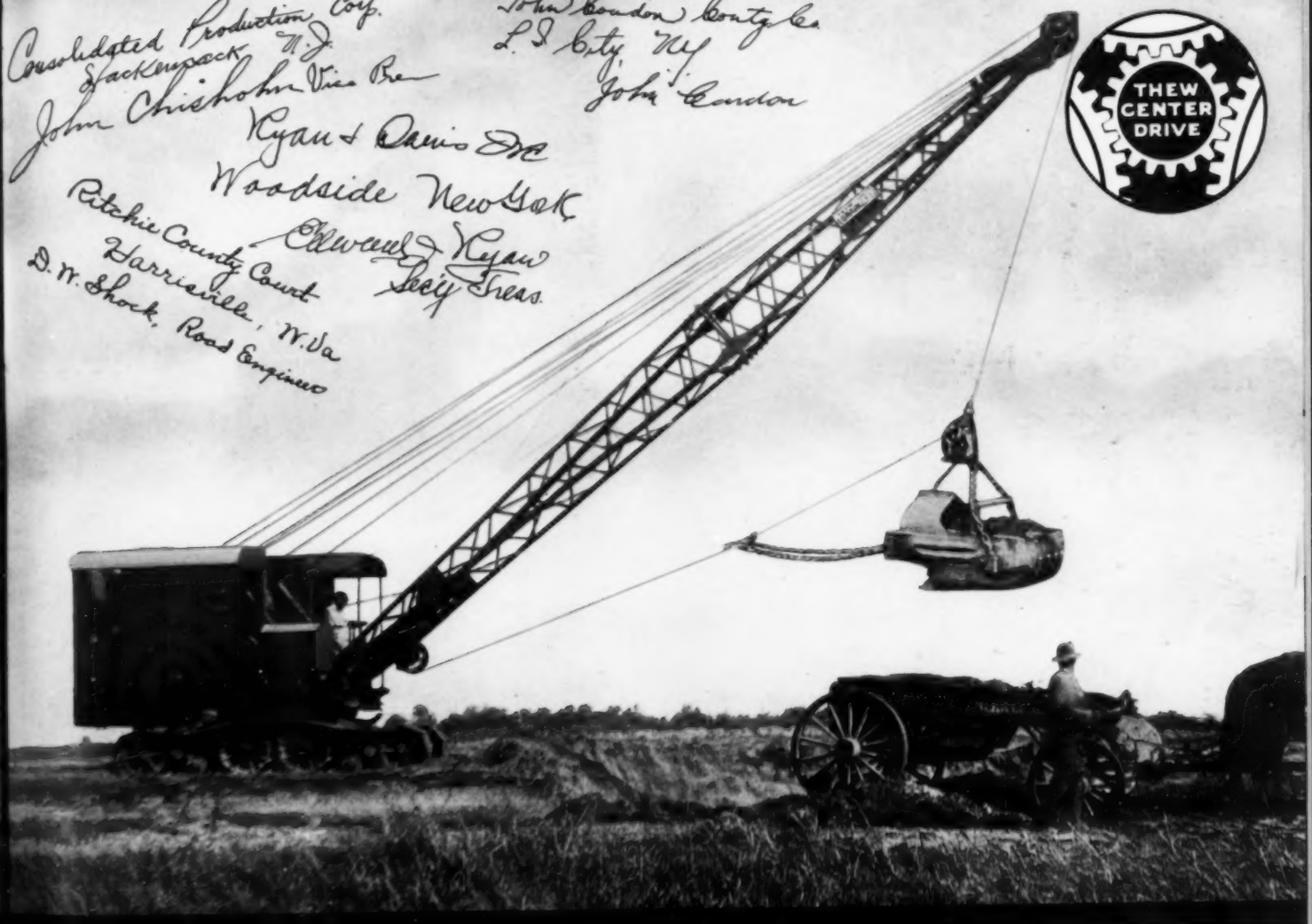


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Bellamy Jones

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Butler Pa

L J Chandler

Roy N Rissler
Lebanon Pa

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Benjamin Welles
Vice-Pres.

Dewees Bros
Phila. Pa.
Frank D Dewees.

Hull & Hollenbeck Inc
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AW Hollenbeck Pres.

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Huntington W Va
D W Fuller - President

Plymouth Excavating Co Inc.
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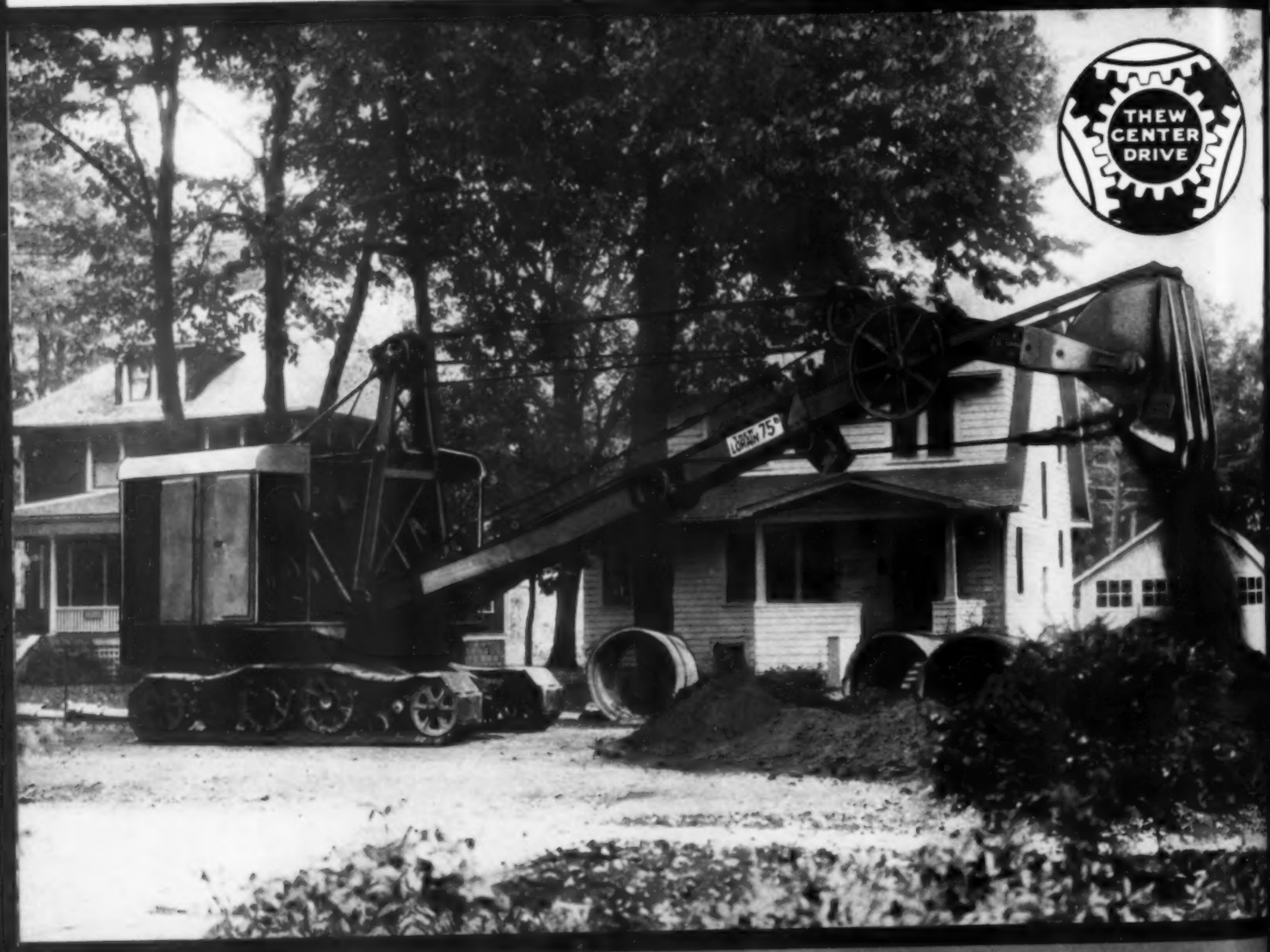
Johnson City
Tenn

Longley & Co Inc.
Lexington Ky
L V Longley Pres.

Shutt Bros Const Co
67 Murray Street
Syracuse N.Y.

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UNIVERSAL 35

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*"Here, Lad—*

Who's your big boy friend? Whence came he and whither is he drifting? He looks like a member of the Divers' Union. Give us an introduction."

*"Yes, Pop—*

And in turn he'll introduce you to profitable associations.

He is '*Arc Welding*—a dominant figure in industry.'

Whence came he? From the desire of progressive architects and engineers for better ways of fabricating and erecting steel.

Whither is he drifting? Into fabricating shops where riveting is now being used and onto jobs where steel is being erected.

And your reference to Divers' Union is apt because he works in DIVERS' ways to produce harmonious UNION of steel and just as harmonious a union of executives, bankers and stockholders."

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***The Lincoln "Stable-Arc" Welder***

— welds easier

— makes better welds

— permits greater output because of the steady uniform arc throughout entire welding range, which is the result of:

Variable voltage design
Laminated magnetic circuit
Separately-excited generator field
Double control of welding heat
All steel construction

*No other welder has all these features.*

"Stable-Arc"

LINCOLN WELDER

# Goodyear Balloons *for* Trucks

## *now end the toll of speed and distance*

Everything that the larger, softer tire brought to the passenger car, this newest Goodyear Balloon brings to trucks—and more.

Greater cushion it gives in generous measure. It holds the road with a greater grip; pulls through soft going; enables your trucks to put more miles behind them in an hour, a day or a season.

But even more than all this the new Goodyear Truck Balloons are *cool running* at maintained high speeds. The internal heat which broke down former tires of higher pressure does not develop in these Goodyear Truck and Bus Balloons.

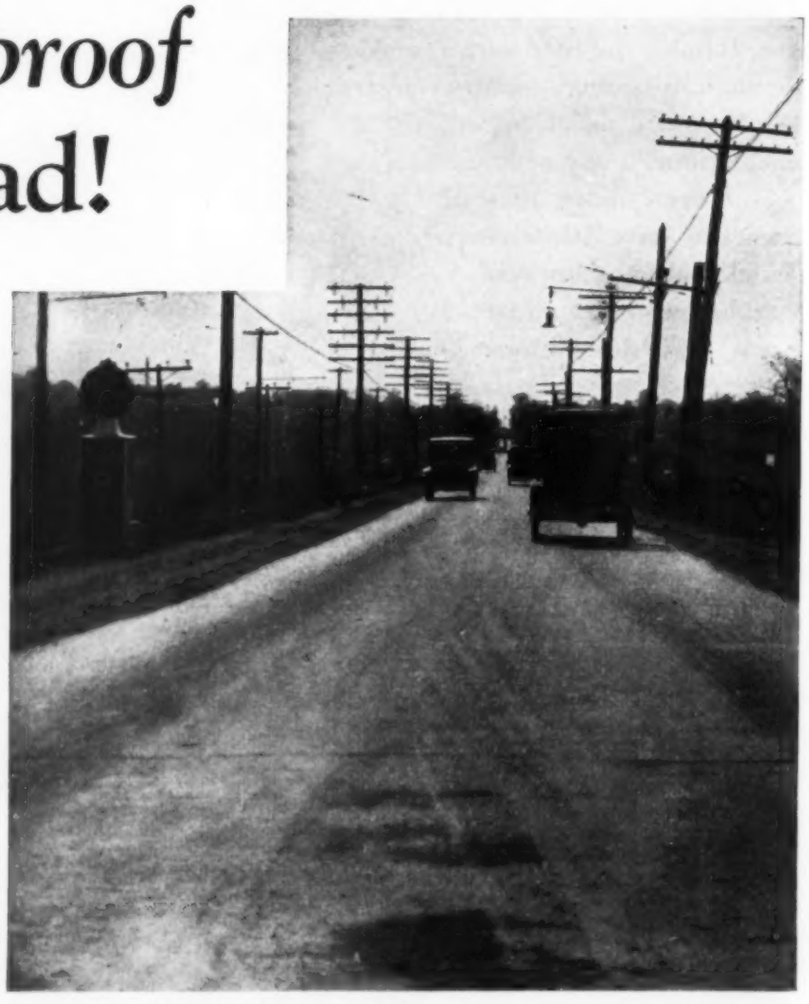
If your tire bills have been mounting, try these new Goodyears. See the costs come down. Consult your nearby Goodyear Truck Tire Service Station Dealer about a change-over on your present trucks. On your new trucks, specify Goodyears—leading truck manufacturers now offer them as optional equipment.

GOODYEAR

**MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND**

# *In winter, when concrete "huddles up," in midsummer, when it "stretches" . . .*

# *Elastite* shock absorbers *wrinkle-proof* this road!



*A typical section of the National Highway, west of Springfield, Ohio—protected by Carey Elastite Expansion Joint, installed transversely at thirty-foot intervals.*

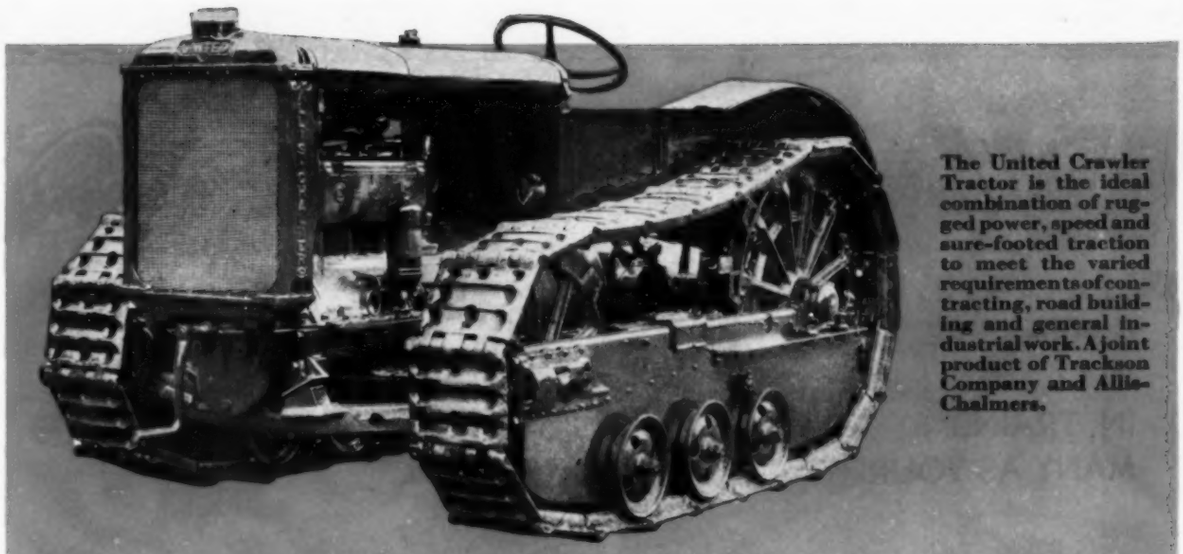
Most every well-known traffic artery, nowadays, is protected against the strains of expansion and contraction by Carey Elastite Expansion Joint. Parts of the National Highway, like the section shown above—the famous Lincoln Highway—mile after mile of the Dixie—the Atlantic and Pacific . . . highways that carry tourist traffic from every State in the Union are smoothed, hump-and-hollow-proofed, *with "shock absorbers" built right into the concrete.*

*The Carey "sandwich" Expansion Joint...*

Carey Elastite Expansion Joint is made of a special blend of asphaltic compound, sandwiched between sheets of asphalt-saturated felt. Preformed —easily installed in any weather. Unaffected by extremes in temperature. Its protection is lasting, yet its cost is but a fraction of the complete construction job. Have us send you full particulars on Expansion Joint installation.

Carey Elastite EXPANSION JOINT

THE PHILIP CAREY COMPANY, *Lockland,* CINCINNATI, OHIO

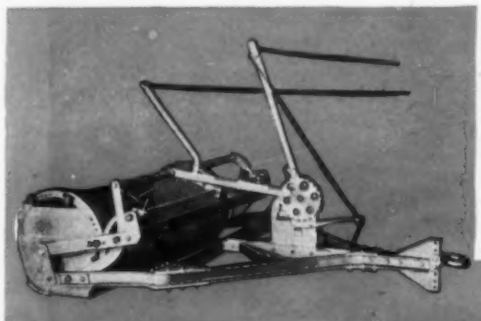


The United Crawler Tractor is the ideal combination of rugged power, speed and sure-footed traction to meet the varied requirements of contracting, road building and general industrial work. A joint product of Trackson Company and Allis-Chalmers.

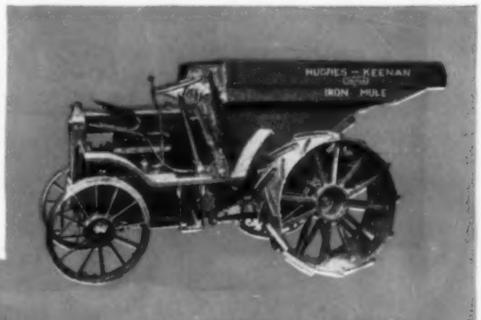
# PROFIT WITH UNITED EQUIPMENT

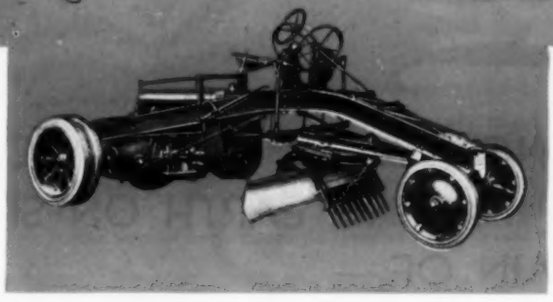
**United Equipment brings efficient, low-cost performance to every job! Powered by the United Industrial Tractor—product of Allis-Chalmers—United Equipment saves time, men and money on road building and maintenance, contracting jobs and other industrial work.**

**Write for details and name of your nearest United distributor.**



United Power Graders, product of Wehr Company, offer all the latest features of Wehr construction plus the outstanding advantages of low-cost United Tractor power. Supplied in either Rear or Center Control models with wheel or crawler traction.



United Victory Scrapers, built by Perry Company, bring new operating ease and economy to every earth moving job where tractor-drawn scraper equipment can be used. One man operates both tractor and scraper, and has easy, positive control of the scraper at all times.

United Iron Mules, product of Hughes-Keenan Co., are dump bodies with complete dumping mechanism mounted on the United Tractor. Combined with the tractor they form a very compact, efficient and economical dumping unit for use on short-haul earth moving.

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# WARCO

## WHEELED SCOOPS

EXCAVATE, HAUL AND DUMP IN CONTINUOUS CYCLES, OPERATED IN TRAINS BY ONE MAN. USE AS MANY AS YOUR TRACTOR WILL PULL

WARCO
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THERE IS NO MORE ECONOMICAL KNOWN METHOD OF MOVING EARTH ON SHORT HAULS THAN A TRAIN OF—

**WARCO WHEELED SCOOPS**

**W. A. RIDDELL COMPANY** BUCYRUS OHIO, U.S.A.

POWER & DRAWN GRADERS - WHEELED SCOOPS - REAR TYPE CRAWLERS

Skidding a 2093 ton bridge over the San Gabriel River, California. *Eighty* times quicker with Blackhawk Hydraulic Jacks.

# HOW ONE-HAND PRESSURE MOVED A 2093-TON BRIDGE

A GIANT bridge to be lifted 10 inches onto rails! Four spans to be skidded simultaneously 15 feet! Traffic moving over the structure at the rate of 12,000 cars a day! The time short and the cost important!

Eight ponderous 100-ton mechanical jacks were tried — two men per jack. Three days of back-breaking effort were wasted. The bridge was shifted only 13 inches.

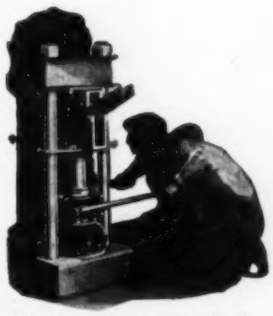
Then eight portable 30-ton Blackhawk Hydraulic Jacks finished the job — quickly and easily, one man to each jack. The remaining distance of nearly 14 feet was covered in 12 hours with 1-1000th inch accuracy. Blackhawk hydraulic power proved *80* times faster.

A Blackhawk lifts, lowers, shifts, presses, bends, and straightens with equal efficiency. Reduces cost, time and labor amazingly. Makes hard jobs simple, expensive jobs cheap, and long jobs short. *Mail coupon for literature.*

BLACKHAWK MANUFACTURING COMPANY
DEPARTMENT C-M MILWAUKEE, WIS.

*Also world's largest manufacturer of socket wrenches*

Lifting load and all by mere finger pressure with a Blackhawk takes the "grief" out of jacking.



Bending I-beams with a Blackhawk saves the cost of a giant hydraulic press. A Blackhawk for every need—1 to 75 tons capacity.

# BLACKHAWK HYDRAULIC JACKS

BLACKHAWK MFG. CO.
Dept.C-M, Milwaukee, Wis.

☐ Send industrial jack folder.

☐ Send industrial wrench folder.

Firm.....

Individual.....

Address.....

# CLETRAC

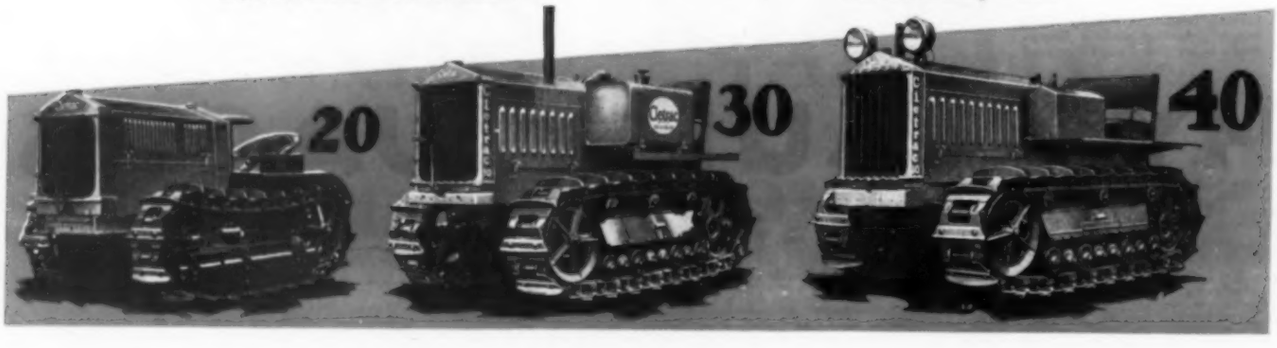
# A New Cletrac Crawler in the Advanced Power Range . .

ANOTHER great power unit — the *Cletrac "80-60"* — is now available. With maximum eighty and rated sixty horse power at the drawbar and covering an extremely wide range of utility in many kinds of work, this new Cletrac is certain to find favor with thousands of operators who want a tractor of outstanding capability!

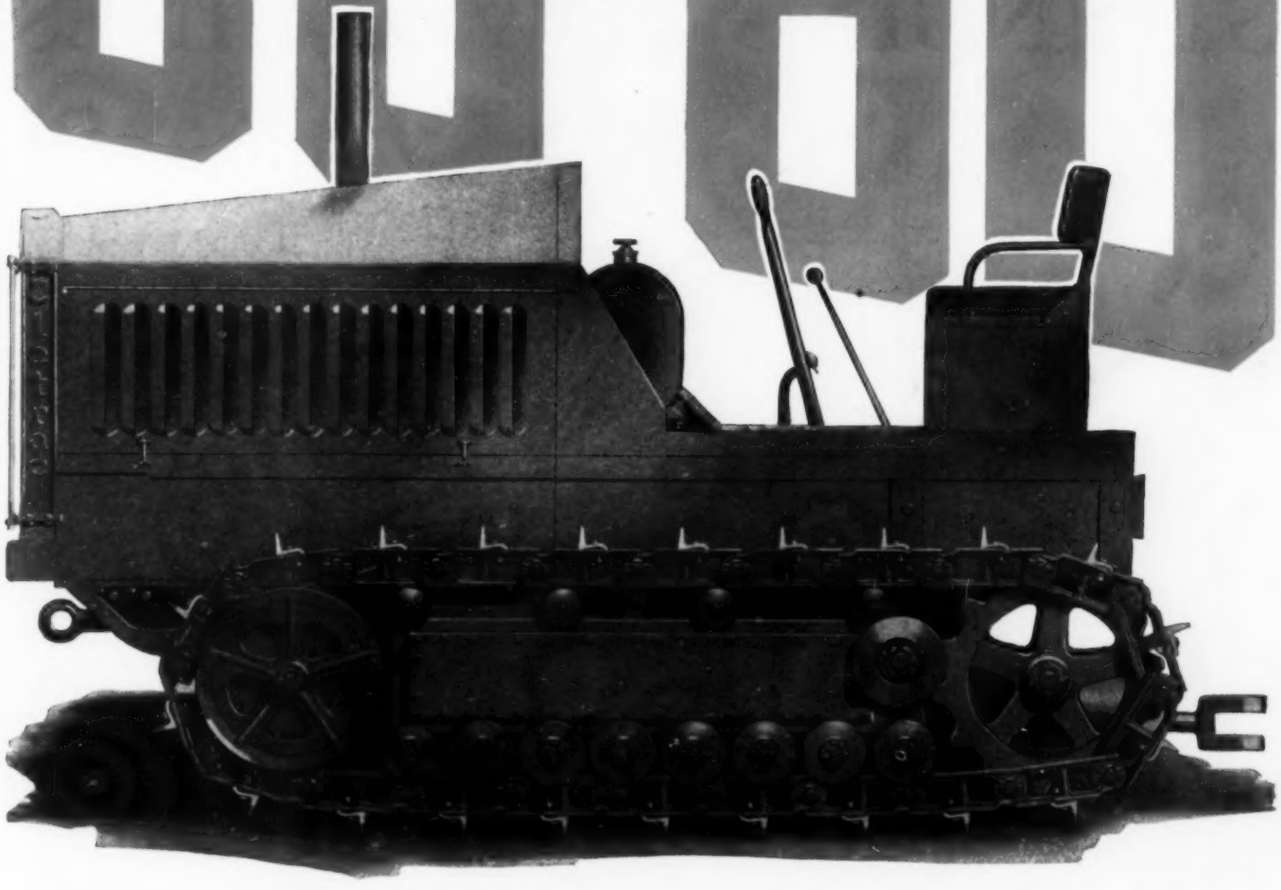
Taking its place with the other famous Cletracs — the "Twenty," "Thirty," "Forty" and "One Hundred" — this new model extends the Cletrac line to meet every possible power need.

*Announcement folder sent on request*

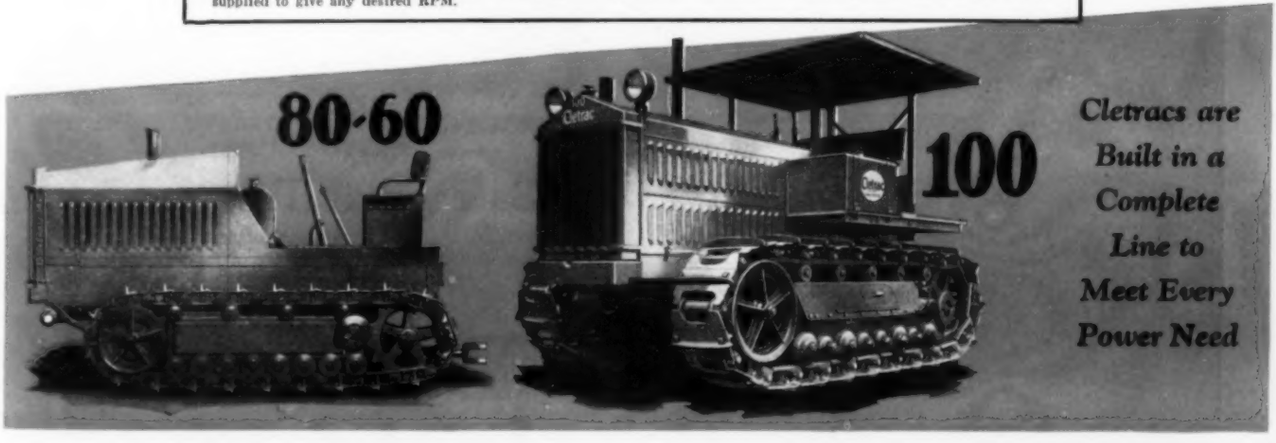
**THE CLEVELAND TRACTOR COMPANY**
**19323 Euclid Avenue** **Cleveland, Ohio**



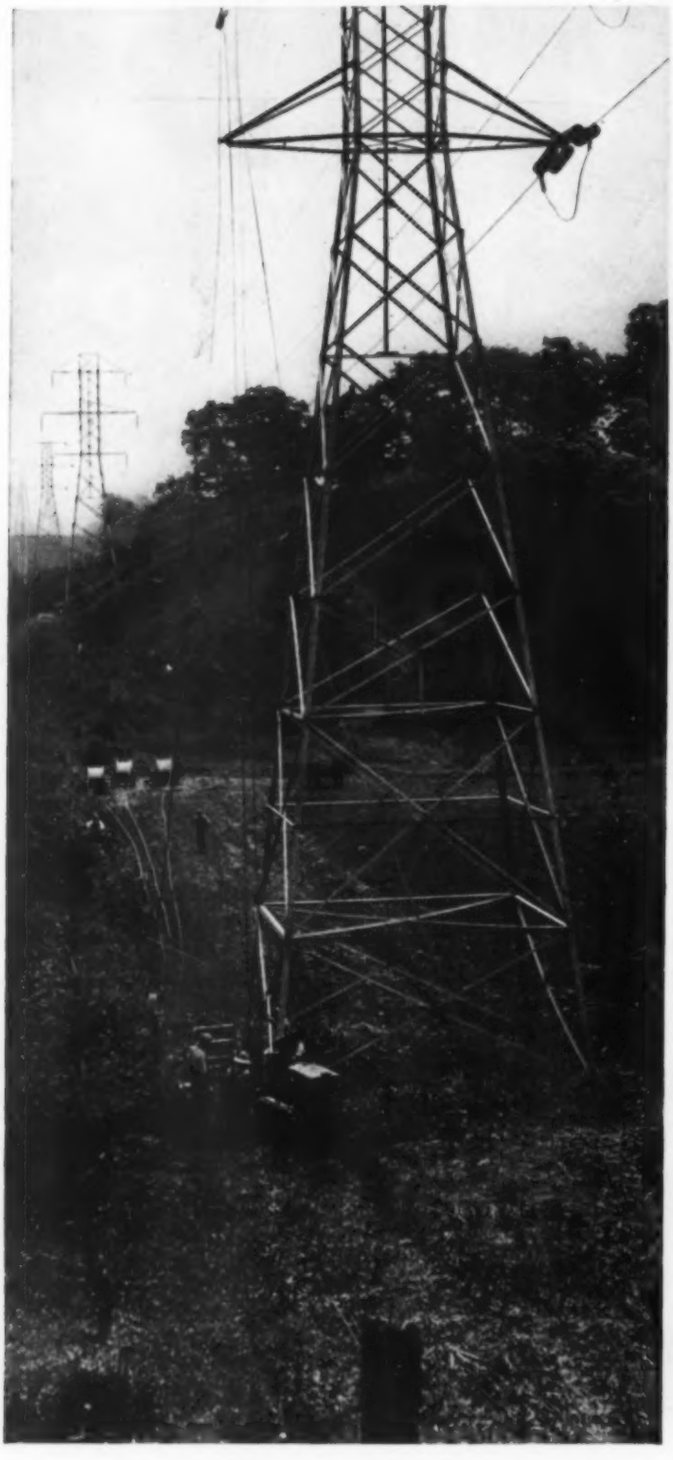
# 80-60



**SPECIFICATIONS** **Motor**—Six cylinder, four cycle, water-cooled, valve-in-head, 5½ inch bore, 6½ stroke. **Motor Lubrication**—Force feed to crank shaft, cam shaft, valve rocker shaft, connecting rods and wrist pins. Splash to cylinder walls. **Starting, Lighting and Ignition**—Delco-Remy. Willard 12 volt battery. **Transmission**—Selective type, three speeds forward and one reverse. Low speed, 1¾ m. p. h.; intermediate speed, 2½ m. p. h.; high speed, 3.6 m. p. h. Reverse speed is 2.1 m. p. h. These ratings given at a governed engine speed of 1000 RPM. **General Dimensions**—Height 7 feet. Width over extended axle shaft 8 feet. Length over-all 12 feet 8 inches. Clearance 16 inches. Turning radius 15 feet. **Ratings**—At draw bar 80 horse power maximum. At power pulley 96 horse power. **Power Pulley and Take-off Extra Equipment**—Attachment furnished with or without belt pulley. Pulley 24 inch diameter, 15 inch face. Operates at 455 RPM at a belt speed of 2980 feet per minute and motor speed 1000 RPM. Power Take-off operates at 444 RPM. A power take-off transmission can be supplied to give any desired RPM.



# STRINGING POWER LINES



## with a "CATERPILLAR" TRACTOR

**A TYPICAL JOB for a "Caterpillar" track-type Tractor — but only one of many! The "Caterpillar" hauls the steel for the towers, helps erect them, pulls the heavy cable reels to place. Then, fitted with a winch, strings and lines, "Caterpillar" Tractors don't ask for roads or even favorable weather—their wide tracks take them to the job and enable them to keep at work the day long and the year through. There's a size for any use — extra equipment to fit them for most any job. Illustrated literature free for the asking.**

*Prices—f. o. b. Peoria, Illinois*

| | | | |
|---|---|---|---|
| TEN . . . | $1100 | TWENTY . | $1900 |
| FIFTEEN . . | $1450 | THIRTY . . | $2375 |
| | | SIXTY . . | $4175 |

**Caterpillar Tractor Co.**

PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.
Track-type Tractors Combines Road Machinery

*(There's a "Caterpillar" Dealer Near You)*

CATERPILLAR
REG. U.S. PAT. OFF.
TRACTOR

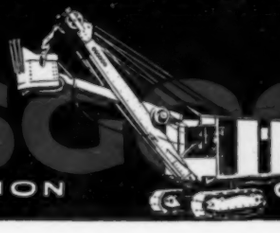
# Control

*This 1¼ yard OSGOOD Conqueror, owned by J. M. Lipscomb, moved 12,800 yards of solid rock in 16 working days with only 2 pieces of hauling equipment. Photo shows his OSGOOD at work on the slope of Lookout Mountain, where he is helping to build the new road connecting Chattanooga with Jasper, Tenn. This great road project, when completed, will cut off 14 miles of winding roadway over Signal Mountain.*

## Accurate High Speed Operation
## MAXIMUM YARDS PER HOUR

When You're rushed for time and there's lots of hard work ahead—*then* you'll fully appreciate an OSGOOD. An OSGOOD is as easy to handle as an automobile. Automotive type foot pedals regulate the crowding action and control the hoisting brake. Vertical control levers operate travel and swing motions and hoisting and pull-back drum clutches. SERVO device harnesses motor power to set the clutches and hold the load. It enables the operator to feel the load on his clutch at all times and keep it under absolute control. This accuracy of control permits great speed on the job. *Let us send you* MORE INFORMATION about OSGOOD.

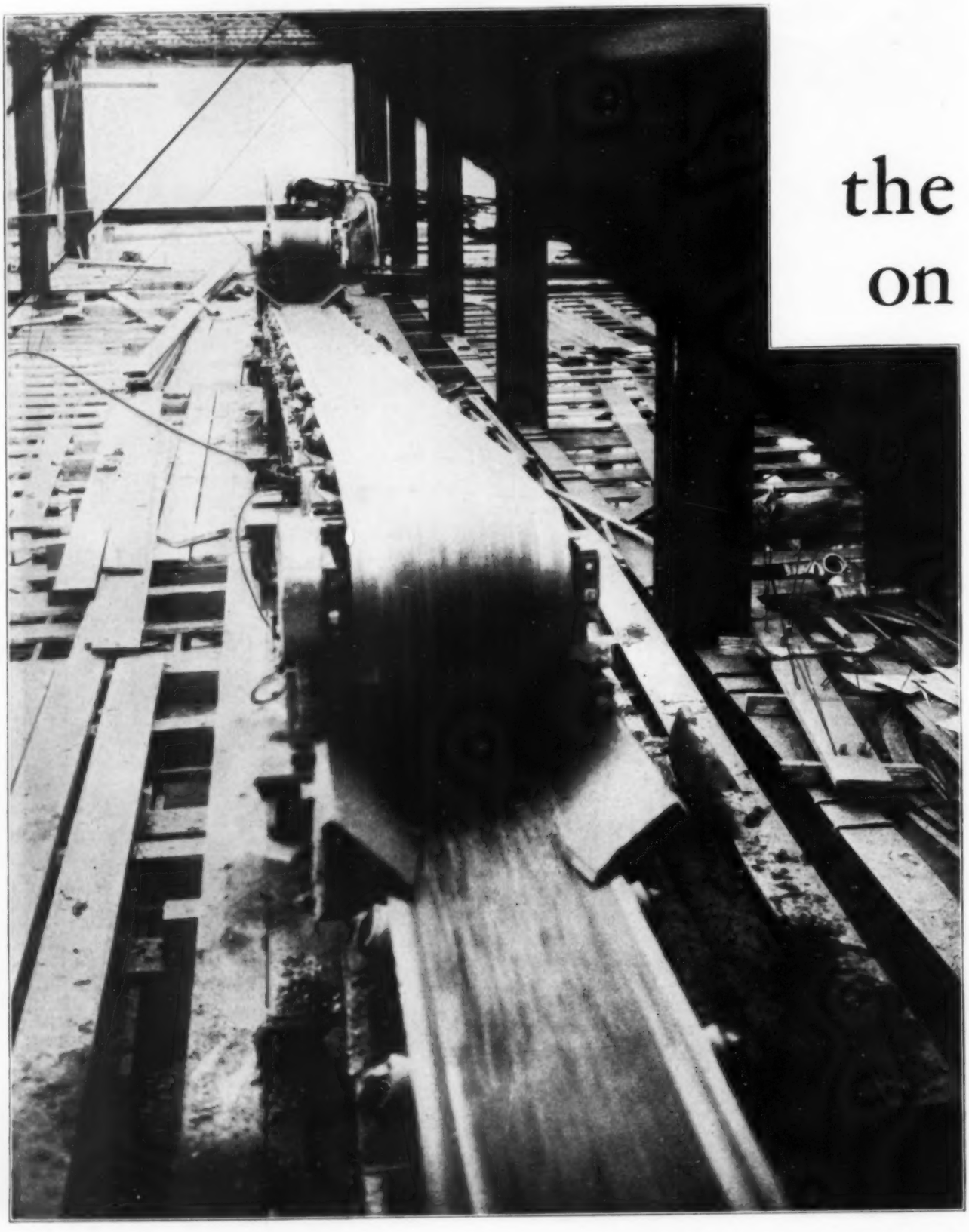
*All ordinary excavating operations are controlled by hand levers and automotive type foot pedals banked at the left front of the cab giving the operator full view of the work at all times. Electric starter button, motor controls, and oil pressure gauge are mounted within easy reach.*

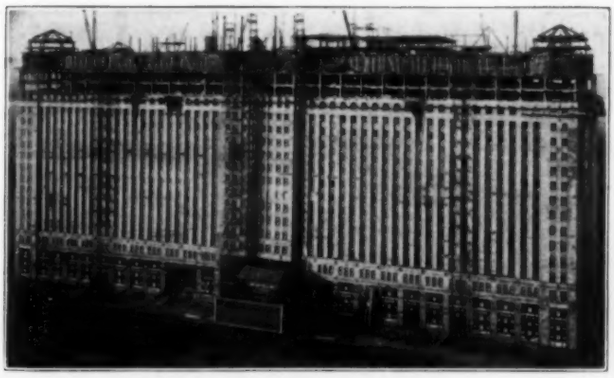


THE OSGOOD CO.
MARION OHIO

¾ TO 6 YARDS
COMMANDER
CONQUEROR
VICTOR
RAILROAD
GASOLINE STEAM
ELECTRIC
DIESEL

# 55 B-G's lick the on





# Concrete Pouring Problem World's Biggest Building

To the left are shown four of the 55 Barber-Greene Belt Conveyors being used by the Griffith Company to lick the concrete pouring and dry aggregate handling problems on the new Marshall Field Merchandise Mart Building.

Frequently as many as 15 of these conveyors are operated in series to carry the concrete to any part of the structure.

Only four mixers grouped into two central mixing plants are needed instead of eight ordinarily required on a building of this size.

And the system is far simpler, much more flexible and decidedly cheaper than other methods.

This is but one of the many jobs detailed in the new B-G wet concrete handling booklet "New Applications and Set Ups."

The book covers large buildings, small buildings, retaining walls, bridges, viaducts, irrigation ditches, sewers, R. R. elevations and similar jobs.

It shows how B-G conveyors handle the dry concrete that many systems cannot handle economically—

How the constant feed of the conveyors forces the men in the forms to work faster—and permits the mixer to be operated at top speed continuously—

How disintegration and separation of the aggregates is reduced to a minimum. Write for your copy today.

*From mixer to forms on small building job*

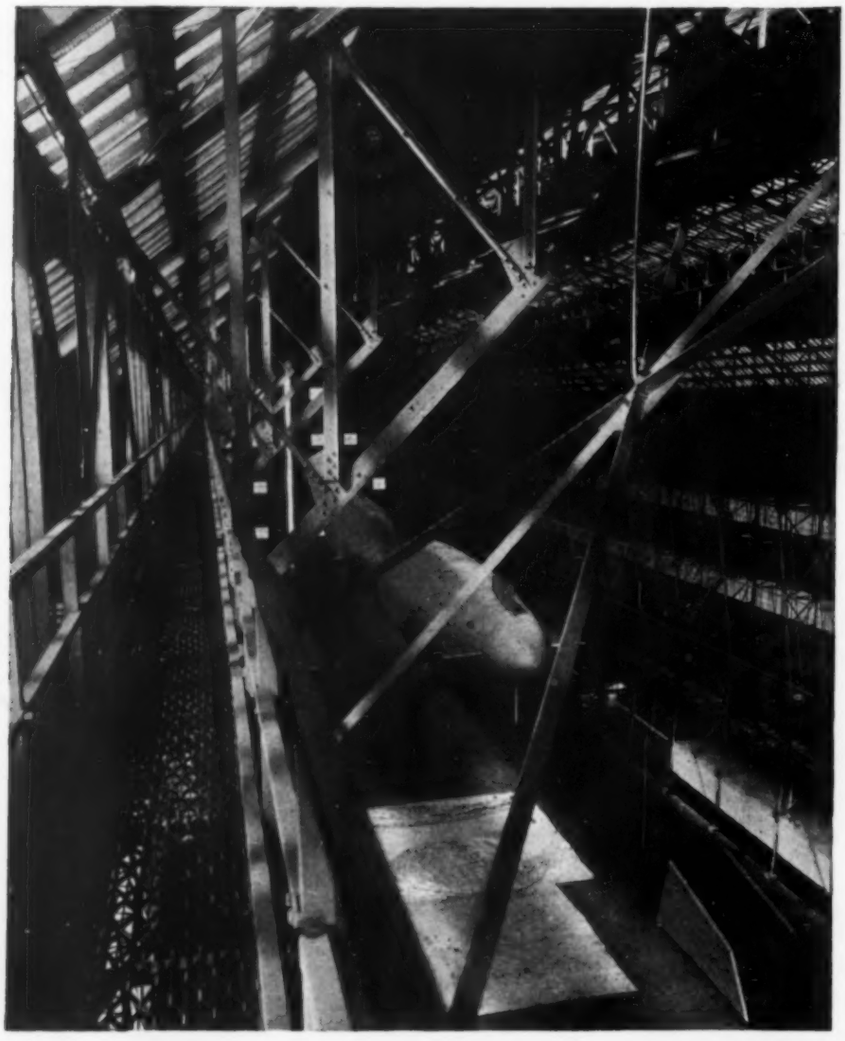
*Discharging a full batch into feeding hopper—on retaining wall job*

BARBER-GREENE COMPANY

530 W. Park Avenue Aurora, Illinois

**BARBER** B STANDARDIZED MATERIAL HANDLING MACHINES G **GREENE**

## STRUCTURAL STEEL CREATED THE SKYSCRAPER



# Build for longer usefulness—with STEEL!

STEEL construction easily defeats obsolescence. In a steel building, floor areas can be increased by added stories. Adjacent additions may be conveniently built. The whole building or any part can be readily altered or remodeled for another purpose. A steel building or bridge can be kept up to date more readily with less expense than any other type of fire-resistive structure, for steel is the most flexible building material known.

Steel is the strongest, most trustworthy and most easily applicable of all structural materials. Structural steel brings so much more speed to construction that its use often results in weeks of extra rental and added savings in interest charges. Economies in building begin with the choice of steel and continue throughout the life of the structure. Build for continued usefulness—build with steel.

A Technical Service Bureau is at the disposal of architects, engineers, owners and others who have need of any information which can be supplied through the American Institute of Steel Construction, Inc.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

The co-operative non-profit service organization of the structural steel industry of the United States and Canada. Correspondence is invited. 200 Madison Avenue, New York City. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas and San Francisco.

The Institute publishes twelve booklets, one on practically every type of steel structure, and provides also in one volume, "The Standard Specification for Structural Steel for Buildings," "The Standard Specification for Fireproofing Structural Steel Buildings," and "The Code of Standard Practice." Any or all of these may be had without charge, simply by addressing the Institute at any of its offices

***STEEL***

***INSURES STRENGTH***

***AND SECURITY***

# Performance under all sorts of conditions!

(Left) In confined places where impossible to swing a hand cross-cut saw

(Above) Knee deep in mud and water

(Left) Cutting close to the ground without excavating

*Under-water Service* to any depth in which divers can operate.

**REED-PRENTICE CORP.**
Worcester Mass., U. S. A.

# WOLF
## Portable Timber Sawing Machine

# IN THE PUBLIC EYE

DIETZ Red Lanterns are SEEN—UNDERSTOOD — and OBEYED.

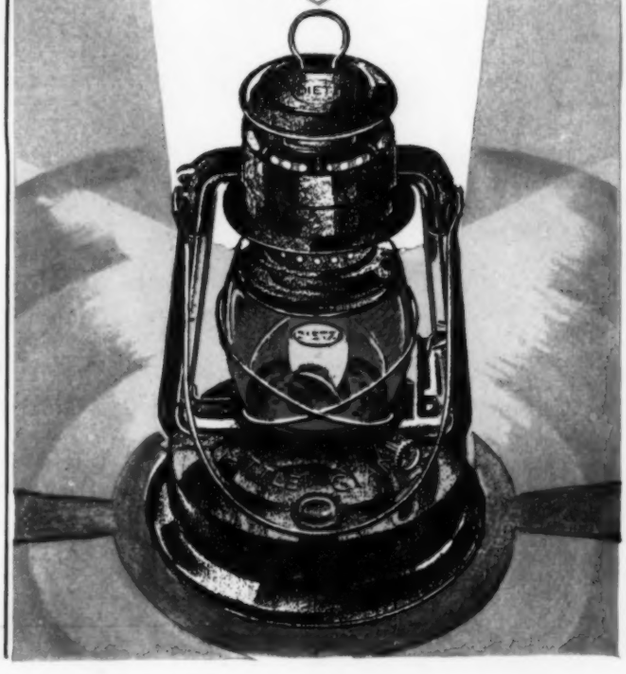
Most contractors use Dietz Red Lanterns for roadside warning duty because they are unequalled in protection afforded at low cost.

The Lantern illustrated—Dietz Little Giant—is only 11½ inches high. It sheds an exceptionally bright light. An over sized oil fount carries kerosene sufficient for 70 hours continuous burning—requiring no attention over a week-end or holiday.

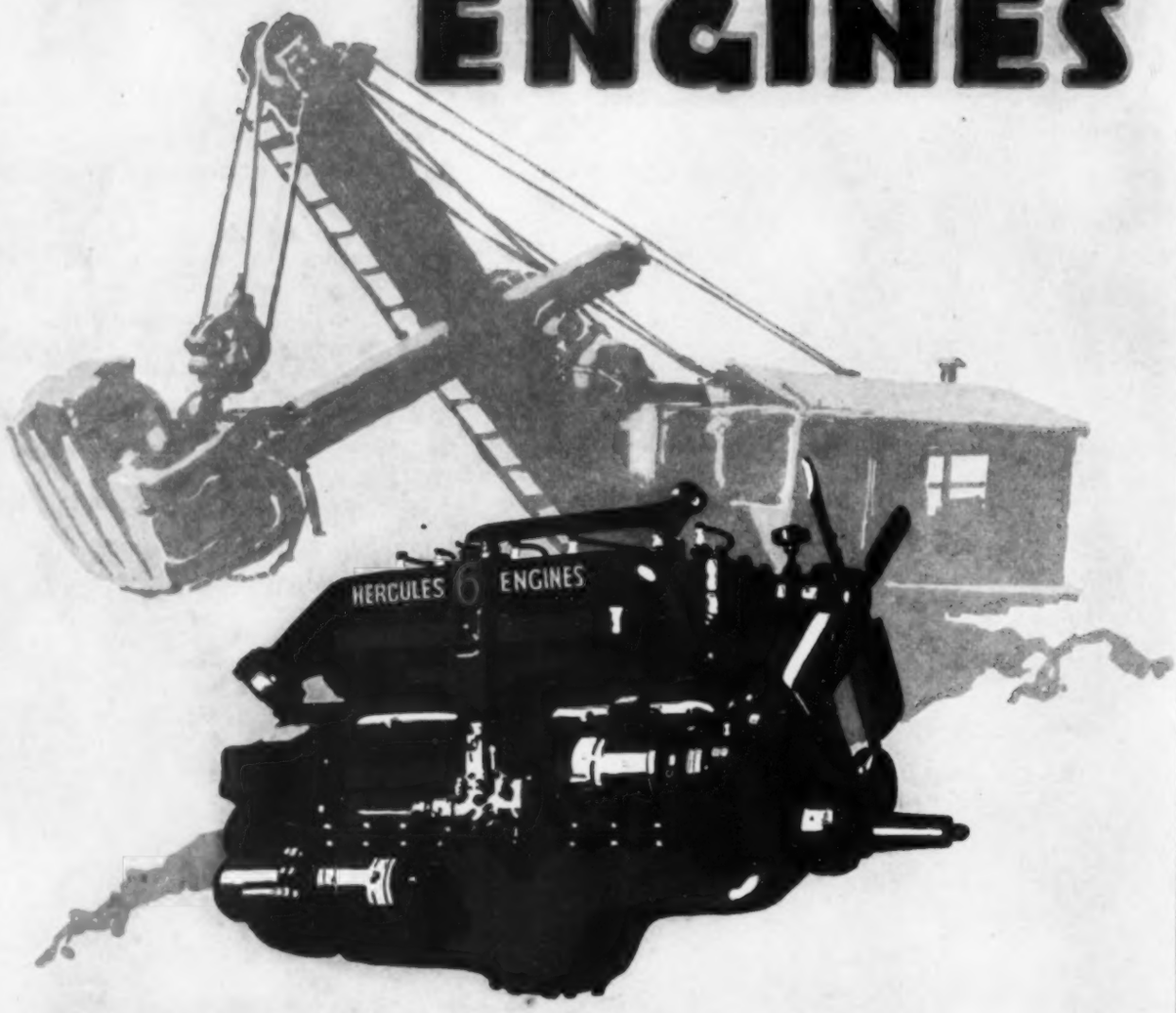
Try "Little Giants" — you'll like them!

**R. E. DIETZ COMPANY**
NEW YORK
*Largest Makers of Lanterns in the World*
FOUNDED 1840

USE RED
No other color means DANGER



# HERCULES ENGINES

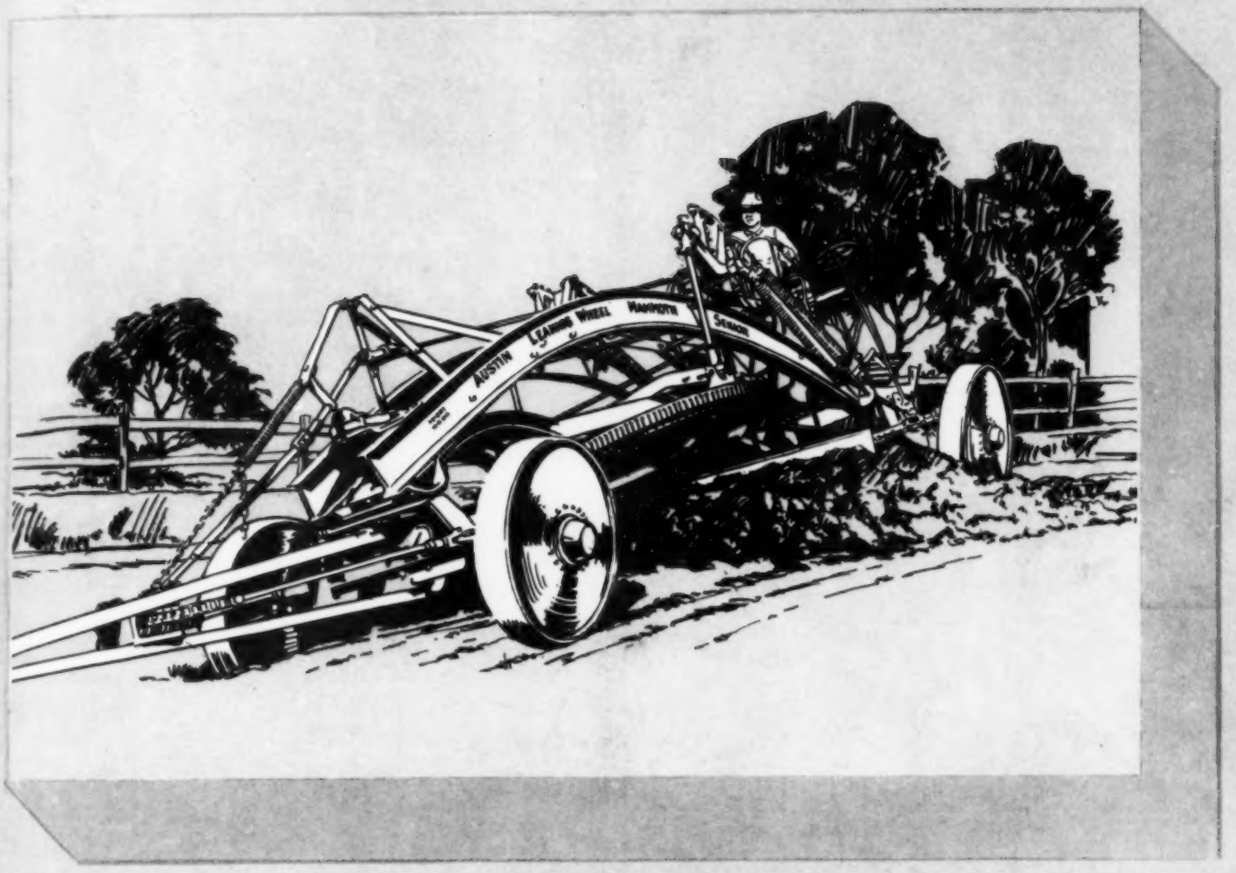



**Hercules Engines are simple in design, advanced in engineering, always modern. That is why so many manufacturers of heavy-duty machinery exhibited or specified Hercules Engines at the Road Show—why Hercules Engines power so many leading trucks and buses.**

**HERCULES MOTORS CORPORATION, CANTON, OHIO, U. S. A.**

**West Coast Branch: Los Angeles, California**
**Mid-Continent Branch: Tulsa, Oklahoma**

# Graders have a definite job




## *—the better they do it—the less it costs*

Graders are purchased to perform definite work. The more of it they do within the limits of each working day—the better it is for everyone concerned with building, using or paying for the road in question.

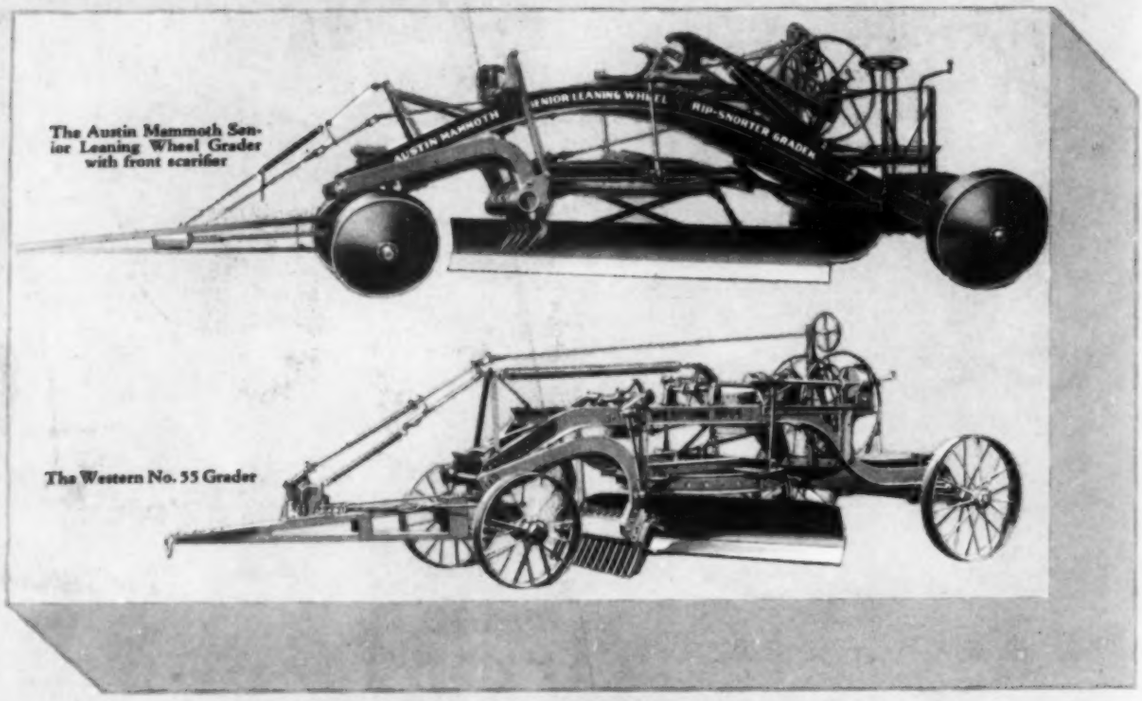
Rich engineering experience and unsurpassed manufacturing facilities enable Austin-Western to produce machines that not only stand the gaff of road building's toughest jobs but are continually establishing new records for efficient and economical performance.

To illustrate what we mean—we suggest that a careful comparison of operating costs be made wherever Austin-Western Road Machinery is being used on a job alongside of similar equipment.

We feel confident that the result of such comparisons will bring out the fact that the Austin-Western line is not only the most complete but also the most efficient line of road machinery ever offered to road builders.

# Austin-Western
## ROAD MACHINERY

# These rugged graders lower operating costs




## *—they are distinguished by their ability to move dirt—their easy handling and freedom from breakdowns*

The ability to keep the dirt moving is the first requirement of a grader. How well they do it under all conditions determines how good they are.

Austin-Western graders have always been noted for their ability to bite into the hardest soil and keep it rolling before the blade. Improvements to increase strength and handling ease are constantly being made in all models to keep pace with improved materials and methods.

The Austin Mammoth Senior Leaning Wheel Grader, when equipped with a front scarifier, performs all the work of tearing up worn-out roads or rough subgrades and regrading in a single operation. It is built to work any place that the most powerful tractor will draw it. The model illustrated is equipped with a twelve-foot blade, disc wheels with removable rims and two-piece, telescopic rear axle.

The Western No. 55 Grader carries a 10-foot blade and will work behind tractors up to 40 hp. Cut gears, ball and socket raising rod connections and a new steerable offset engine hitch with enclosed worm gears running in grease combine great strength with unusual handling ease.

The Austin-Western Grader Line includes straight and leaning wheel models, ranging in weight from 1250 to 11,530 lbs., and in blade length from 6 to 14 feet.

*Write for complete information*

**THE AUSTIN-WESTERN ROAD MACHINERY CO.**

400 North Michigan Avenue, CHICAGO, ILLINOIS—Branches in principal cities

Leaning Wheel Graders, Straight Wheel Graders, Dual Drive Motor Graders, Elevating Graders, Crawler Dump Wagons, Scarifiers, Rock Crushers, Portable Conveyors, Rollers, Motor Sweepers, Street Sweepers, Sprinklers, Road Oilers, Hot Patch Portable Asphalt Plants, Plows and Scrapers

# *The* Judgment *of* The Years

This 60" GOHI Corrugated Culvert installation was made in 1915 at Ray Mill Dam in North Carolina. The Consulting Engineer, under whose direction the culvert was installed, makes a sworn statement that the culvert is today in excellent condition, in spite of the extreme abrasive action to which it has been subjected during all these years.

GENUINE OPEN HEARTH IRON
GOHI
TRADE MARK
PURE IRON - COPPER ALLOY
REG U.S. PAT. OFF.

(Meets copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

# *Corrugated* Culverts

## have done more for *Good Roads* than any other type

Time — the court of last resort — sets its unqualified approval on GOHI Corrugated Culverts for modern road drainage.

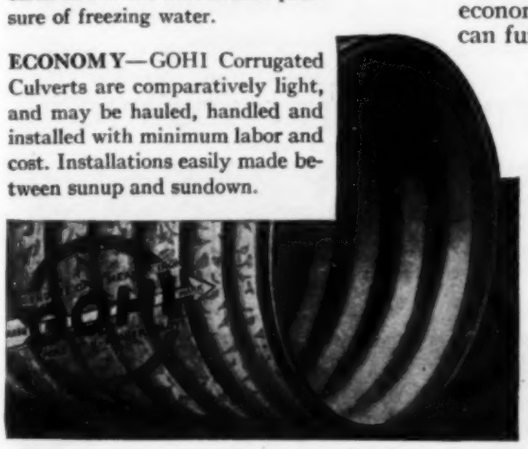
Made of Genuine Open Hearth Iron, pure iron-copper alloy, they offer maximum resistance to corrosion and are outstanding for durability in the metal culvert field.

Thousands of installations conclusively prove that GOHI Pure Iron-Copper Alloy outlasts any iron or steel and gives the lowest-cost-per-year service of any culvert material. Specify GOHI Corrugated Culverts for economy and permanence. Any GOHI Culvert Fabricator listed below can furnish authoritative technical service on any culvert installation.

**STRENGTH**—GOHI Corrugated Culverts stand up year after year under heaviest traffic conditions.

**FLEXIBILITY**—GOHI Corrugated Culverts are flexible — cannot crack or break under shifting earth fills or the tremendous pressure of freezing water.

**ECONOMY**—GOHI Corrugated Culverts are comparatively light, and may be hauled, handled and installed with minimum labor and cost. Installations easily made between sunup and sundown.



**GOHI CULVERT MANUFACTURERS, Inc., Newport, Ky.**

**Capital City Culvert Co.**
Madison, Wis.

**Central Culvert Co.**
Ottumwa, Iowa

**Denver Steel & Iron Works Co.**
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**Tennison Brothers**
Texarkana, Ark.

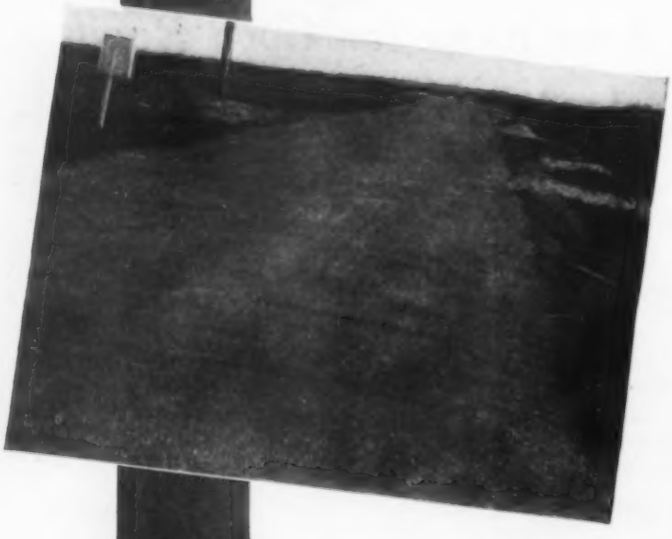
# NEW ROADS FOR OLD!

## RECLAIM THE WORN-OUT CONCRETE WITH

COLAS
REG. TRADE MARK

**An emulsion of pure unfluxed straight run asphaltic bitumen.**

*A concrete road at Langley Field, Va., built during the war. Note pot holes and scaling.*



*The same road with new Colas surface.*

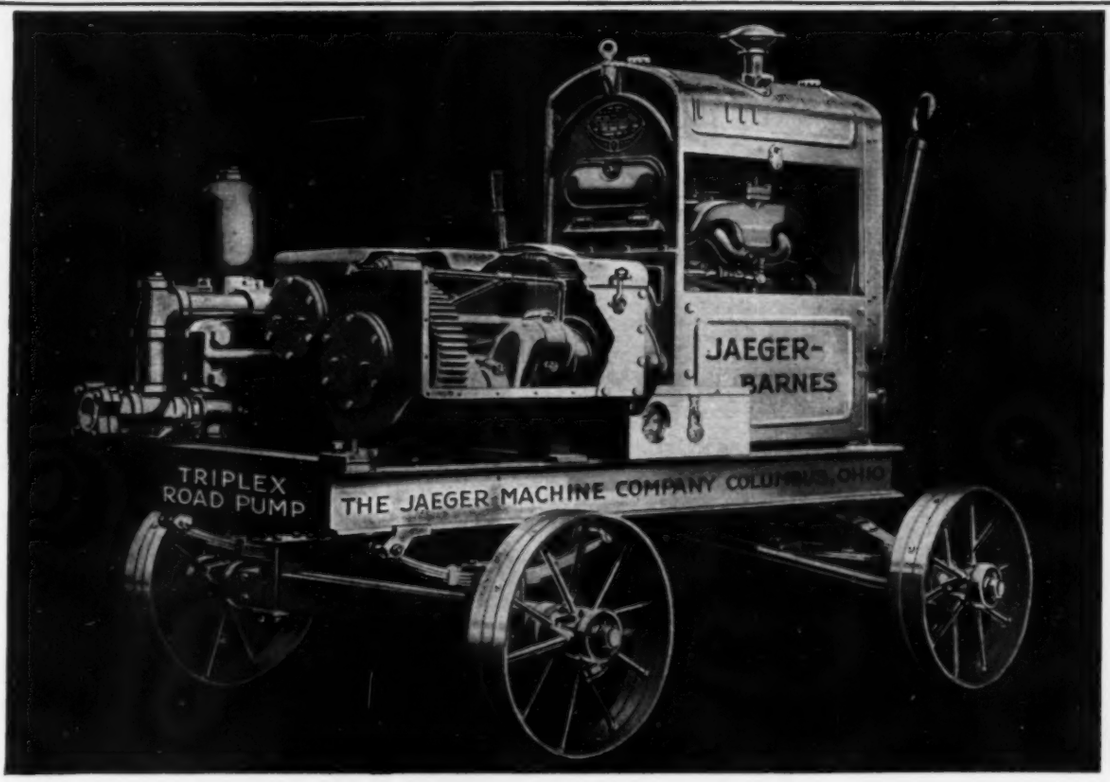
Colas is especially valuable for reclaiming old worn-out concrete roads such as that appearing in the upper illustration. Its property of forming a perfect bond between the old road and the new topping insures a smooth riding, non-skid wearing surface. Low costs, ease of application and immunity to weather delays are other characteristics which in America are bringing Colas the enthusiastic reception it has long enjoyed in Europe.

***Send for specifications.***

**FLINTKOTE ROADS INC.**
**(Colas Licensees)**
PERSHING SQ. BLDG. NEW YORK
PARK SQ. BLDG. BOSTON
ASSOCIATED COMPANIES THROUGHOUT THE WORLD

COLAS .. builds Durable Low-cost Roads ..

# *The* ROLLS-ROYCE *of* ROAD PUMPS



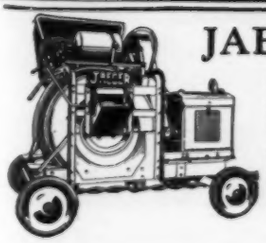

# ENGINEERED to Give Unfailing Water Supply . . . TESTED and PROVEN on a Thousand Jobs!

ONLY fully self-oiling road pump with roller bearings on all shafts. Simplest oiling system, with patented, positive, rotary oiling pump. Every part works in dust-proof case.

Steel cut gears and pinions, unbreakable forged crankshaft, detachable cylinder block casting, removable cylinders, pistons hardened against wear. Reinforced steel trucks, semi-elliptic springs, automotive type front axle with steering knuckles.

Horizontal design provides better automatic lubrication, easier inspection of all parts. And more than 100 Jaeger stations assure quick service anywhere.

FORCE PUMPS—SELF PRIMING CENTRIFUGALS **JAEGER-BARNES** PLUNGER TRENCH PUMPS CONVERTIBLE DIAPHRAGMS



## JAEGER 10S MIXER

All steel, short coupled, direct driven, handles like a 7S, gives heavy duty 2-bag service.

Other non-tilts 7, 14, 21, 28, 56S. Tilters 3½, 5, 7, 10S size.

*Ask about "Jiffy" Placing Plant for Conveying and Hoisting.*

## JAEGER MIXERS...PUMPS... HOISTS—*Information Slip*

THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus, O.
Send catalog, prices and full data on—
( ) Jaeger-Barnes Pumps ( ) Jaeger Mixers ( ) Hoists

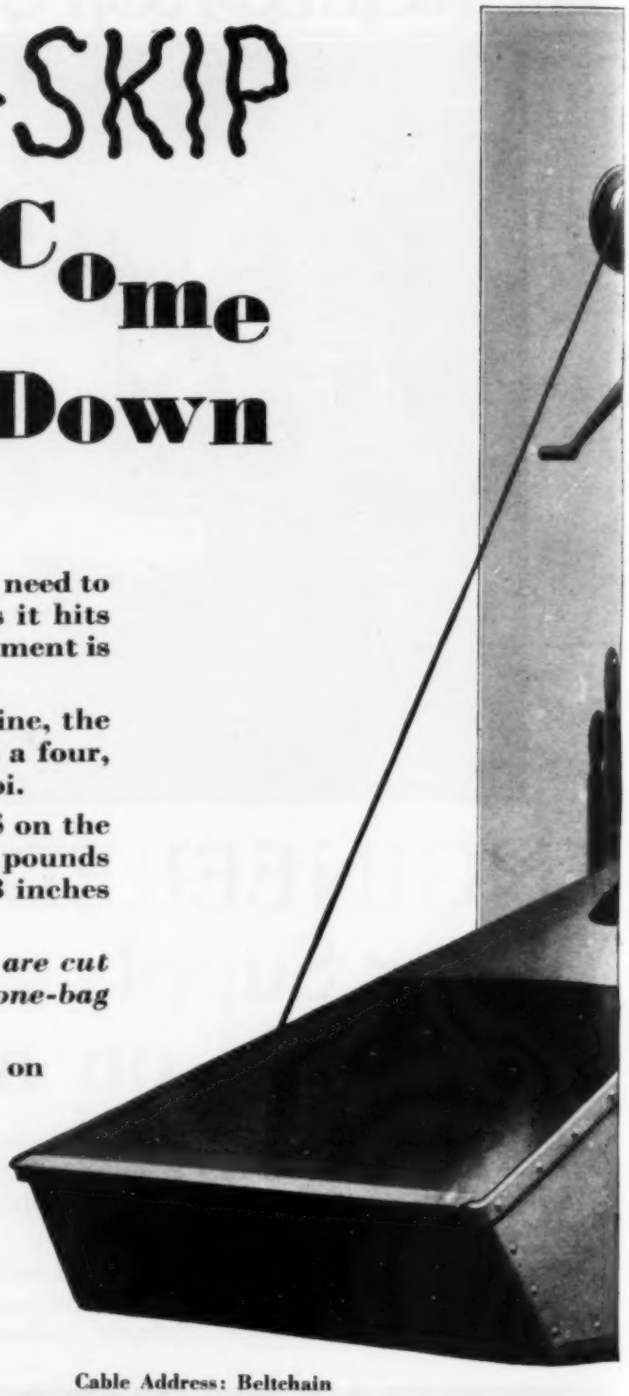
Name _____

Address _____

# Four Cylinder Ball Bear

# SHIMMY-SKIP

# But Prices Come Tumbling Down



**Throw away your hammer. You don't need to pound or shake the Rex 7-S Skip. As it hits top, every speck of sand, gravel and cement is "Shimmied" into the drum.**

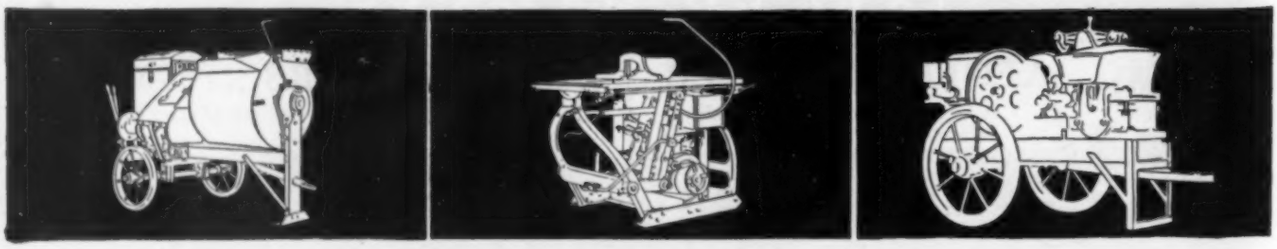
**But that's not all. You get a new engine, the finest put on any one-bag mixer. It's a four, not two, cylinder, Ball-Bearing, Le Roi.**

**And you get the lightest, shortest 7-S on the market—by actual measurement 470 pounds lighter than the next lightest, and 13 inches shorter than the next shortest.**

***Yet prices on this great new Rex 7-S are cut way below the prices that set the one-bag value last year.***

**Check the coupon for the new catalog, on this all-steel, high-speed performer and its two companions, the 5-S and 10-S.**

**Cable Address: Beltchain**



**Rex Diaphragm Pumps ◆ Rex Saw Rigs ◆ Rex Plaster and Mortar Mixers ◆ Concrete Mixers ◆ Pavers ◆ Plaster Mixers**

# ing Engine - *and the New*

**REX**
**CONSTRUCTION EQUIPMENT**

**CHAIN BELT COMPANY, 764 Park St., Milwaukee, Wisc.**
**Check catalogs you wish and mail today**

| | | | | | |
|---|---|---|---|---|---|
| Tilter | ☐ | Diaphragm | ☐ | Saw Rigs | ☐ |
| 5-7-10-S | ☐ | Centrifugal | ☐ | Plaster & | |
| 14-S Mixer | ☐ | Plunger Pumps | ☐ | Mortar Mixers | ☐ |
| 28-S Mixer | ☐ | Road Pumps | ☐ | Elevators & | |
| 27-E Paver | ☐ | | | Conveyors | ☐ |

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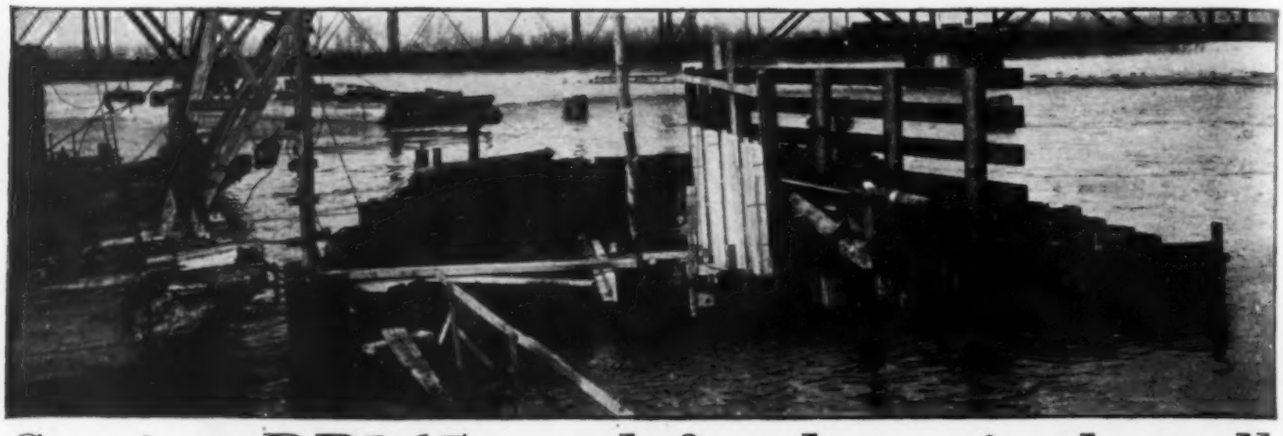
Address.....

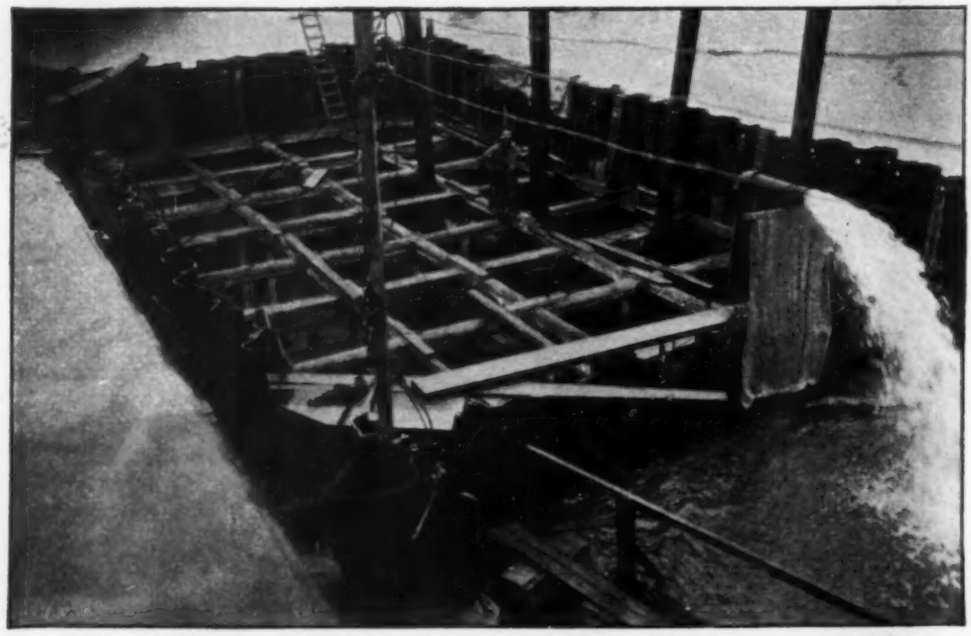
City..... State.....

**Pumps ◆ Saw Rigs ◆ Chain ◆ Sprockets ◆ Buckets ◆ Transmission ◆ Elevators ◆ Conveyors ◆ Traveling Water Screens**

# Lackawanna Deep Arch Piling



## Section DP165 used for deep single-wall



**Congress Construction Company,** ***Chicago, Illinois —Contractors***

## Cofferdam at Pekin, Ill.

**This 80 ft. x 40 ft. cofferdam was constructed in water 34 feet deep. The cofferdam was pumped out to a depth of 40 feet below water level. One 6-inch pump, in operation only half the time, kept the cofferdam dry.**

**Lackawanna Deep Arch Piling, section DP165, in lengths of 55 feet, was used. This was the fourth job on which the contractors used this particular lot of piling.**

**The contractors commented upon the watertightness and the high transverse strength of this Deep Arch Piling Section. During the concreting, the top cross braces were removed so that the piling actually supported a 13-foot head of water in cantilever with apparently little or no deflection.**

Bethlehem Steel Company, General Offices: Bethlehem, Pa.

*District Offices:* New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

*Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

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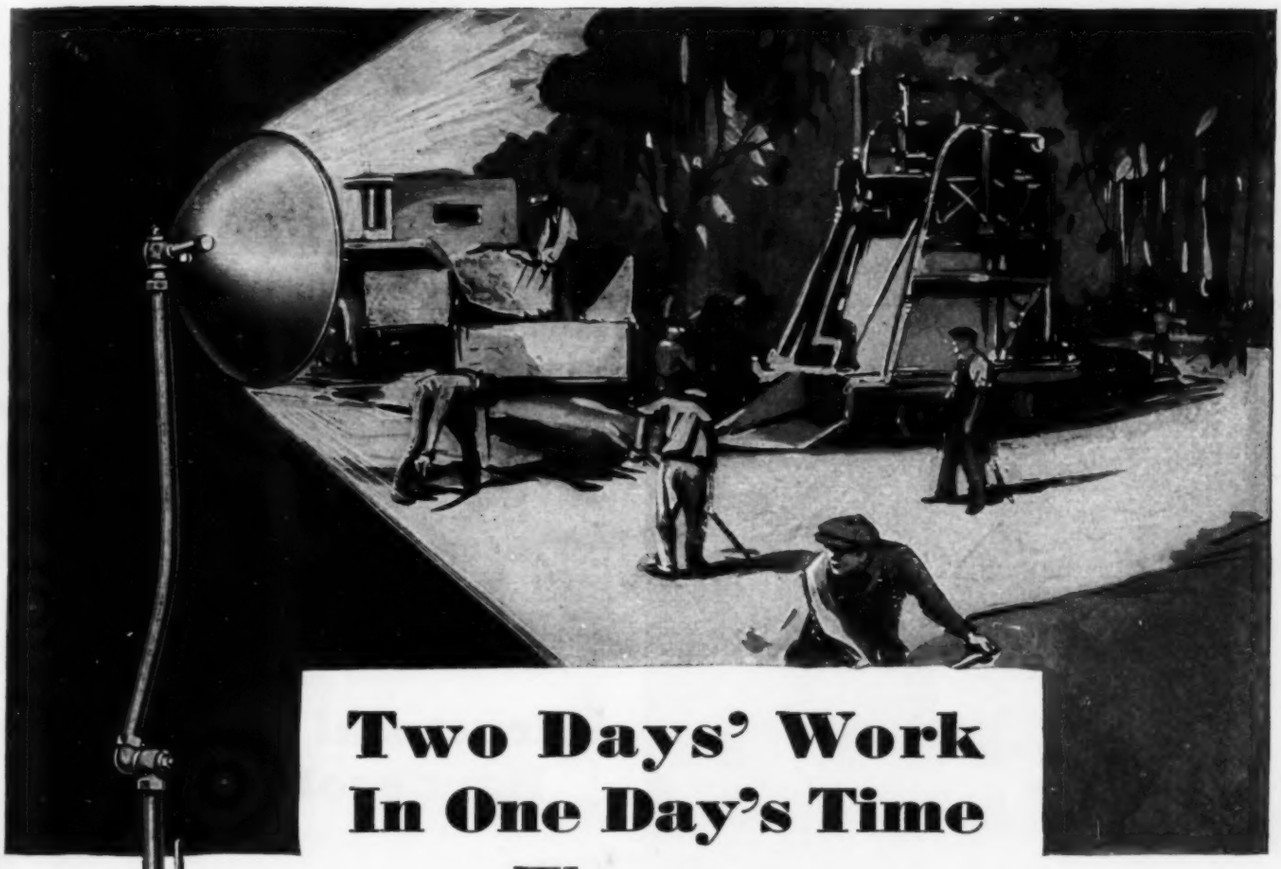
# BETHLEHEM



# Two Days' Work In One Day's Time

WHEN days grow shorter—when dark hours crowd out productive operation—speed up your job with a night shift.

Carbic Flood Lights are powerful, portable units that supply clear white perfectly diffused light. They are rugged pieces of equipment built to serve you night after night.

Carbic Light requires no costly installation. Any inexperienced workman can charge it in a few minutes—and it is ready for hours of continuous service.

Carbic Light costs only a few cents an hour.

*Extend Your Working Day With*
CARBIC LIGHT

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*Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.*

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205 East 42nd Street, New York, N. Y.

Without obligation, I would like to have additional information on Carbic Lights.

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*Street Address*_____

*City*_____ *State*_____ C.M.-2

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Steel
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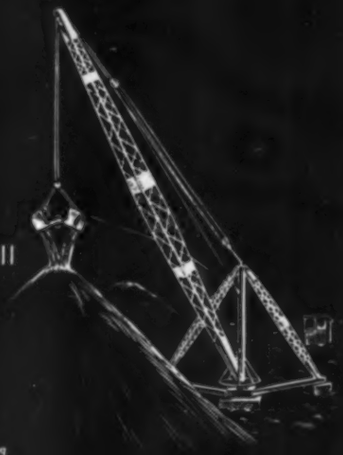
Leaders
Since 1883

All strains
provided
for

Heavy structural
steel construction



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with a clamshell

Quality Engineering

American Hoist & Derrick Co.
Saint Paul, Minnesota

—for every man connected with the design or construction of civil engineering structures—

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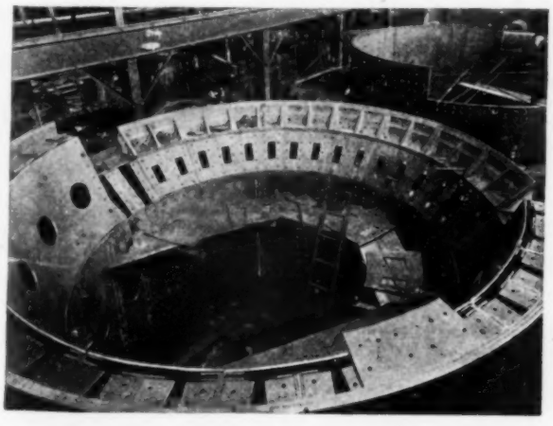
# . . . Biggs' Service Includes Specialized, Personal Counsel; also Supervision of the Installation of Steel Pipe, if You Desire

*Biggs 42 in. diameter Electrically Welded Pipe being installed for the City of Detroit, Dearborn project.*

*Twin lines of 48 in. diameter Biggs Riveted Steel Pipe installed for The Goodyear Tire & Rubber Company, Akron, Ohio*



*View showing the cutting edges of 18-foot diameter tunnel shields built by Biggs for Patrick McGovern, Inc., New York City*

The Biggs Boiler Works Co. Akron Ohio

Biggs is far more than a source of supply for the strongest and most modern steel pipe in the world. The Biggs follow-through also furnishes all the information, counsel, data, and personal supervision needed by the contractor to complete his project with dispatch and profit.

*"Built by Biggs"*

**Welded Steel Pipe**
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**Steel Plate Construction of Every Description**

If you desire, the Biggs organization will lay the pipe for you. You can hand over all this responsibility—and your confidence will be justified by results made possible by Biggs' more than 42 years' acquaintance with all the major problems, as well as the intricate details, of steel pipe manufacture, fabrication and installation.

Biggs Welded Steel Pipe is already delivering satisfactory service on eleven large municipal projects.

Biggs Steel Pipe, welded or riveted, is the product of a specializing plant with remarkable heavy duty equipment. The Biggs weld is stronger than the plate itself, proved so by countless bend, torsion, tension, and hydrostatic tests, as well as a service record of long standing. Mail the coupon for a pictorial presentation of Biggs' story, entitled "Unusual Steel Plate Construction."

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Please send "Unusual Steel Plate Construction" to .....

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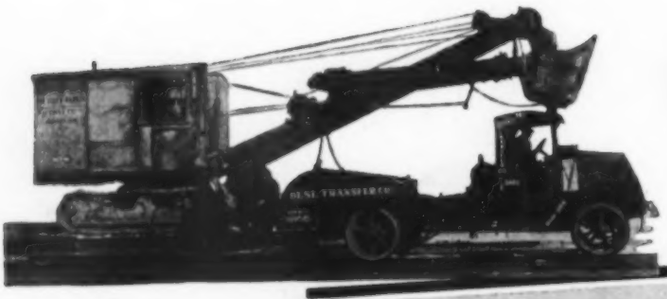
**BIGGS Steel Pipe** ***Riveted and Welded***

The Biggs Boiler Works Co. Akron Ohio

# Typical Experiences of a ROGERS User



*"It was about 12 above zero when the shovel photo was taken," wrote Mr. Besl. "but we came over a lot of slippery streets with snow and ice galore, and the tractor and trailer behaved wonderfully."*

*"The two snaps," writes Mr. Besl, "show how we moved a boat, the 'Dotty Lew', and unloaded it into the Ohio River. "We had extremely close quarters in which to turn out of the yard, and to top it off, the 'Doty Lew' is just twice as long as the trailer from the gooseneck to the rear."*

**ROGERS**
*World's Standard*
**HEAVY DUTY**
**TRAILERS**

**You must have equipment *before* you get jobs. Send today for Rogers Catalog No. 28.**

Two characteristics have marked the Rogers Trailer with increasing distinctness as the "World's Standard Heavy Duty Trailer."

One is the frequency with which it has been identified with the most outstanding and noteworthy moving jobs all over the country.

The second is its unrivalled reputation for successfully coping with difficult situations and unfavorable conditions.

The experiences of Mr. Frank Besl, Jr., progressive and enterprising moving contractor of Cincinnati, with his 15-ton Rogers Trailer are typical of the way the Rogers meets the demands of unusual hauling jobs and adverse conditions.

*"I did not think we would do any long distance work with this outfit when I bought it," Mr. Besl states in his letter, "but we have received a surprising number of contracts of this nature.*

*"One trip, from Erlanger, Kentucky to Metamore, Indiana, was through three states.*

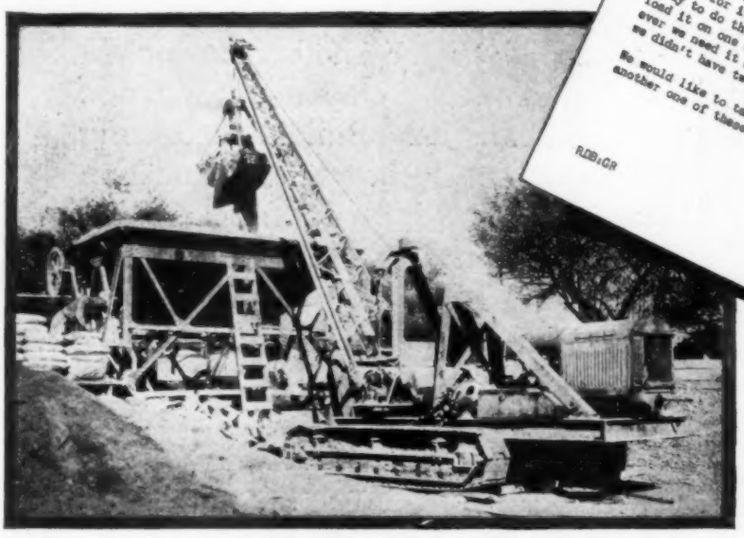
*"Each time the whole outfit came through with flying colors, and we still have all the original tires, which I think is very good, considering the loads we have hauled and the long distance trips which were made during the summer."*

Actual experiences of other users are included in Rogers Catalog No. 28. Write for your copy.

**ROGERS BROTHERS CORPORATION**

**106 Orchard St., Albion, Penna**

# BAY-CITY
## REPLACING LARGER SHOVELS —and Saving Money for Contractors



RAY D BAKER
CONTRACTOR

Oct. 16th 1929

Mr. H. A. Derr,
% Bay City Shovels, Inc.,
6011 Mandalay Avenue,
Detroit, Michigan.

Dear Sir:

At the present time we are using our tractor shovel for charging bins with concrete aggregate; we are pouring from one hundred to one hundred and fifty yards of concrete per day, and the machine is handling the work very nicely,—just as well as a much larger machine.

We are very well pleased with this machine; we have more demands for it than any other machine we have. It is so handy to do the odd jobs around construction work. We load it on one of our extra heavy trucks and take it where ever we need it most. Have been sorry several times that we didn't have two of them.

We would like to talk with you next spring regarding another one of these.

RDB:GR

Yours very truly

RAY D. BAKER, CONTRACTOR

Ray D Baker

NOW—on stock piles for instance—here is a job usually done by a large, more expensive machine but . . . read Mr. Ray D. Baker's letter . . .

The ¾-swing Tractor Shovel is handling concrete aggregate from two separate stock piles, "just as well as a much larger machine." There is no need to tie up a full revolving machine on work of this character when you own a flexible little Tractor Shovel—equip it with crane or shovel boom, trench hoe or backfiller attachment and it's ready to do your bidding—always on the job—a member of the "BAY CITY Family of Fast Workers."

The BAY-CITY Tractor Shovel is not a *cheap* machine—its *cheapness* lies in its ability to do *all* sorts of odd jobs, its economy of operation, its mobility to move from job to job quickly under its own power—or for long distances, just load it on a truck. No trailer or haulage costs to add to expenses. It is a dependable, sturdy, money-making machine—the difference between *profit* and *loss* may be in your plant equipment.

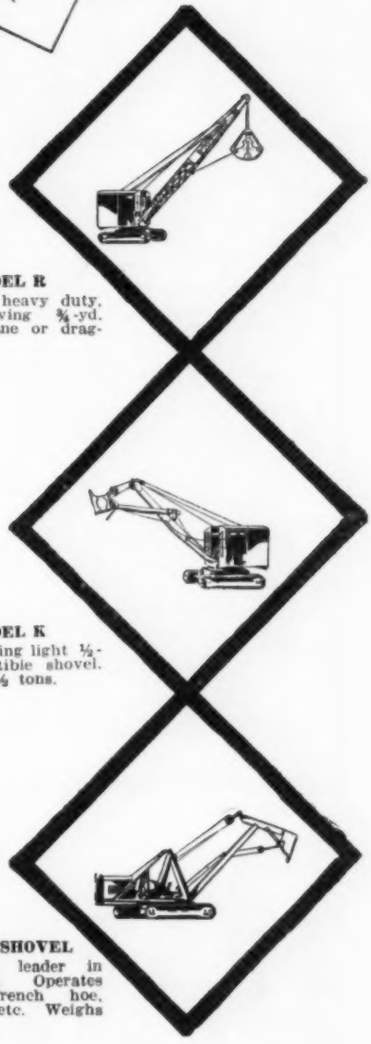
Write us for further information and prices or ask our nearest dealer for a demonstration.

BAY CITY SHOVELS, Inc.

New York Office—302 Broadway BAY CITY, MICH.

# BAY-CITY

**The BAY-CITY family of fast workers**



**MODEL R**
A 26-ton, heavy duty, full revolving ¾-yd. shovel, crane or dragline.

**MODEL K**
Full revolving light ½-yd. convertible shovel. Weighs 14½ tons.

**TRACTOR SHOVEL**
Recognized leader in its field. Operates shovel, Trench hoe, backfiller, etc. Weighs 10 tons.

# BONEDRIED

A complete MORETRENCH WELLPOINT SYSTEM took eleven feet of water out of this excavation—dried up the quicksand—made it behave—sit up—and act—like a gentleman. *And quicksand can do just that provided you treat it intelligently*

The job is for another downtown New York skyscraper—the gigantic Holland Plaza Building, covering an entire block. The Foundation Company of New York are the contractors.

**Moore Trench Machine Co.**
Rockaway, N. J.

# CONTRACTORS NEED LIGHT EQUIPMENT

**ESPECIALLY for those short-time jobs that require a hoist for a few hours or a few days . . . for material handling and elevator work on small buildings . . . for all jobs where ease and speed of moving equipment are important . . the most serviceable hoist and the one demanded by contractors is the hoist stripped of every excess pound.**

## DAKE LG HOISTS

**Gasoline or electric powered, meet the demands for light equipment. Models up to 20 H. P. are light because they are all-steel electric arc-welded and have the distinctive Dake one-piece frame. Other models up to 27 H. P. are equipped with Timken bearings.**

# DAKE ENGINE COMPANY

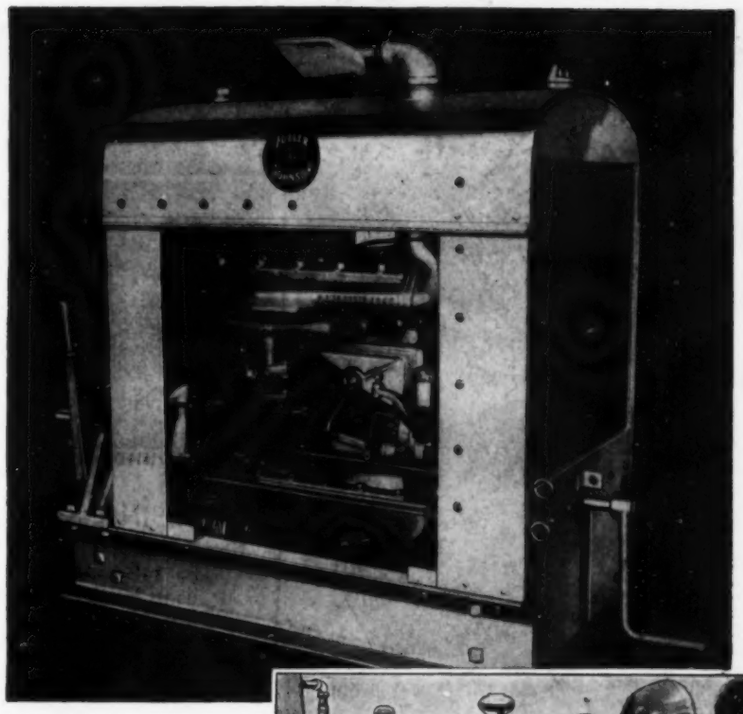
DAKE ENGINE CO.
Grand Haven, Michigan.

Please send, without obligating me, your catalog describing the new DAKE LG Hoists.

Name.....

Street.....

City.....State.....

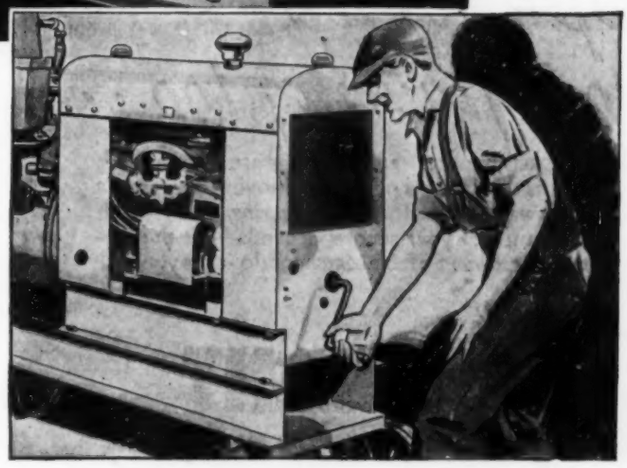


*Showing Model AX, 20 to 25 hp., four-cylinder power unit.*

# *EASY TO START*

With a specially designed carburetor . . . high compression, Ricardo combustion chamber . . . . high grade ignition system insuring hot spark . . . . hot spot manifold . . . and finally *right hand cranking* regardless of the direction of rotation of the power take-off . . . just a turn of the crank and the engine starts.

Electric starter . . . of the six volt automotive type . . . can be furnished on Fuller & Johnson multi-cylinder engines. This feature solves the problem of frequent starting and stopping. And, in addition, this equipment furnishes ample light for that night work so often necessary on rush jobs.



*Right hand cranking regardless of the direction of rotation of power take-off.*

Complete details of the engine illustrated . . . or other Fuller & Johnson power units . . . . . sent on request. Write Fuller & Johnson Manufacturing Co., manufacturers of single and multi-cylinder . . . air and water cooled . . . horizontal and vertical engines, in various sizes. Address: 20 Coma Street, Madison, Wisconsin

**FULLER & JOHNSON**

**ENGINE SPECIALISTS** **ESTABLISHED 1840**

# *Speed up your figuring, too . .*

SPEED, more speed in every phase of your work is the demand of this fast moving age. Here's the way to speed up your *figuring*, upon which so much of your success depends—let the mechanical brain of the Marchant do it for you.

*New*

## MARCHANT PORTABLE *Calculator* $125

***Adds, Subtracts***
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Relieves your brain of tiresome detail, leaving you free for the important things. Figures any problem, from simplest to most complicated, in 25% to 40% less time and with absolute accuracy. No need to check the computation—it's right the first time.

Faster than a slide rule and with far greater capacity.

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# *Sterling* WHEELBARROWS

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**RISING to new heights—considerable detail was given to selection of equipment used on the Chrysler Building. "Sterling," say Fred T. Ley & Co., builders of this building, "was selected because they appeared most rugged and handled easiest. Our experience confirmed our decision with excellent satisfaction."**

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STERLING WHEELBARROW COMPANY
Milwaukee Wisconsin

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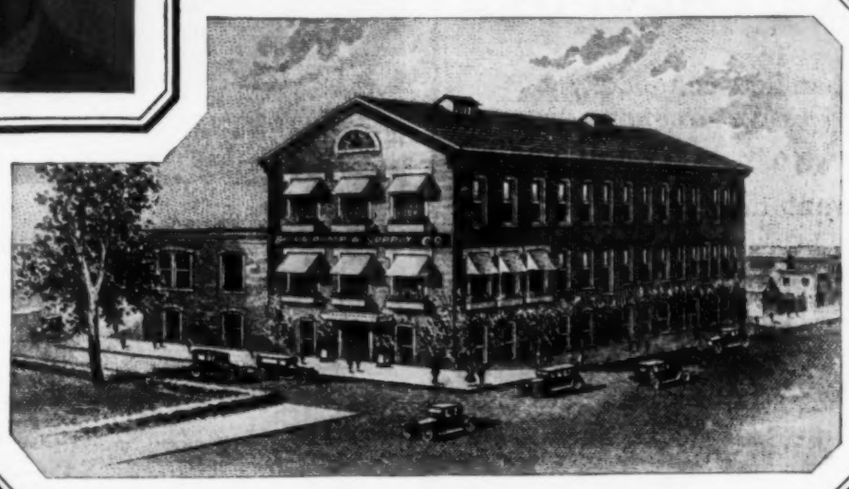
# "Rent—Heat—Light—Insurance

## *Expenses You Need Not Pay*



Above—Mr. F. B. Timberlake, President of Biggs Pump & Supply Company of La Fayette, Indiana. This company's services are of a definite economic value to the prosperity of its business territory.

**WE can save any consumer of industrial supplies, warehouse expense, which means—rent—heat—light—and insurance.**

**To be able to make that statement means we must investigate exhaustively all competing sources of supply who make the merchandise we handle. We recommend Republic's Belting — Hose — Packing — Molded and Lathe Cut Goods."**

**The above statement is characteristic of those made by prominent distributors all over the country. It explains in part how the Industrial Supply Distributor, helping to solve the important problem of broad markets and *economical* distribution, upholds high quality, maintains fair prices and saves needless efforts on the part of both consumer and manufacturer.**

There is a difference in fire and mill hose regardless of specifications as is well known by thousands of users of Republic Hose.

You are invited to ask for a sample of Republic Fire and Mill Hose, so that you may make your own comparisons.

**THE REPUBLIC RUBBER CO.**

**Youngstown Ohio**

**REPUBLIC means the Best Mechanical Rubber Goods**

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## Plus Insulation Plus Waterproofing

Can be handled completely by any progressive roofing contractor.

If you want more information about this profitable business, let our representative talk to you.

The complete line comprises three types, Ferrodeck, I-Plates and Ferrobord. This latter type is laid like boards with extreme economy in labor and material.

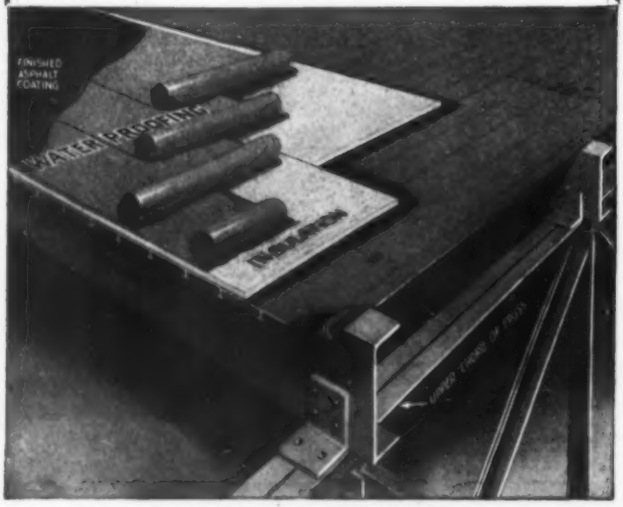
*Catalogs on request.*

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO

*Warehouses and Offices in Principal Cities*

Truscon Steel Company of Canada, Limited, Walkerville, Ont.

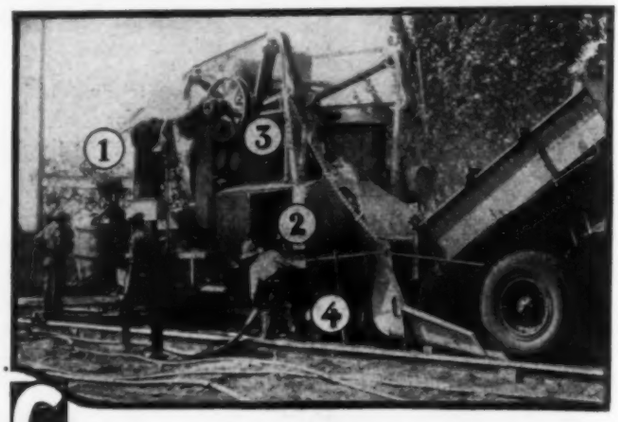
A PRODUCT OF TRUSCON




Truscon Steeldeck Roof with I-Plates



# DIXON'S GRAPHITE PRODUCTS




## Count the points on this paver where you can *save money!*

For better lubrication means lower maintenance—and DIXON'S GRAPHITE Products, for use in construction machinery mean better lubrication. Hard, tough going on any job is the kind of service DIXON welcomes. You'll find DIXON Products will save money at every point spotted.

1 *Water Proof Graphite Grease*—for heavy, slow speed service. Cannot be washed off, or thrown off. Prevents rust. Highly effective as both a lubricant and a rust preventive for wire ropes, chains, exposed gears, cranes, derricks, dredges, steam shovels, hoisting engines, etc.—any equipment used in construction operations.

2 *Flake Graphite*—for auxiliary lubrication with oils and greases. Unequalled for cooling hot bearings. Improves lubrication of engine cylinders, gears, pump plungers, etc.

3 *Pipe Joint Compound*—keeps joints tight and makes them easily opened. Of great advantage in piping carrying steam, water or gas.

4 *Graphite Grease*—made in six degrees of hardness, gives the full benefits of graphite combined in the best mineral oil.

*Put DIXON'S GRAPHITE PRODUCTS to work on your jobs. They will keep wheels turning smoothly—economically.*

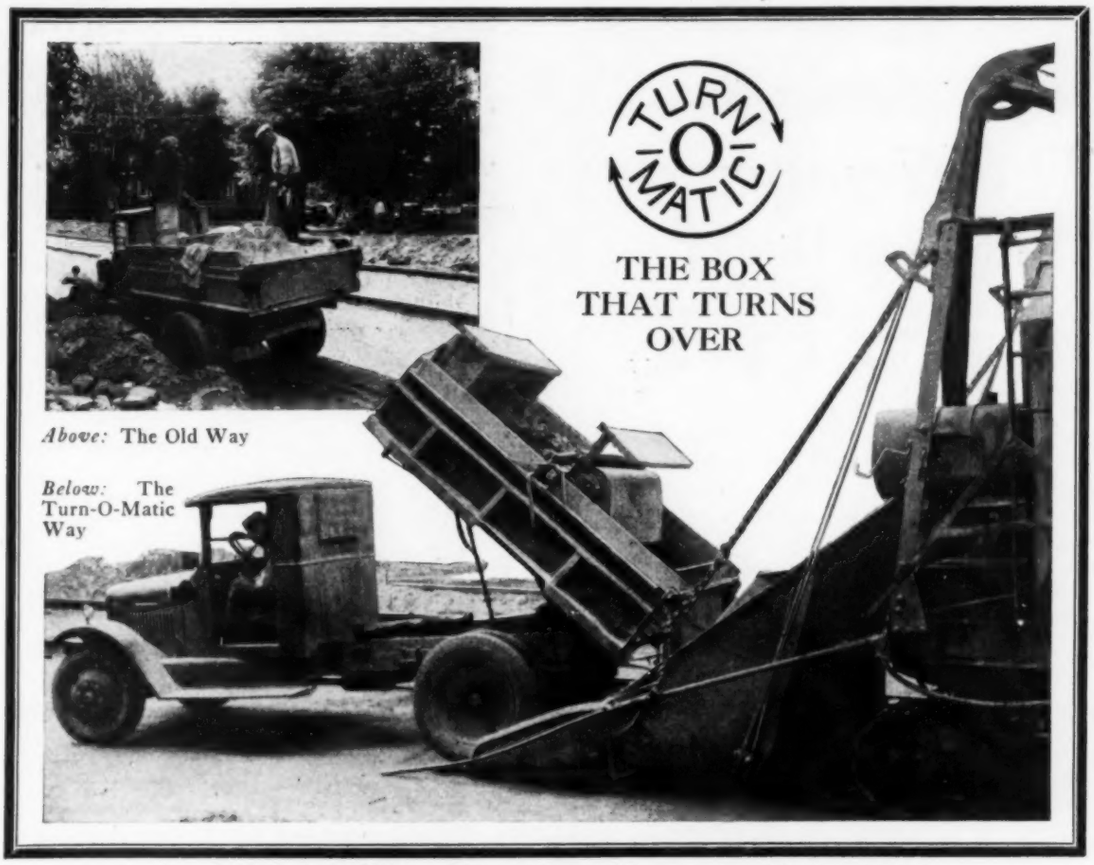
*Write for Samples and Circular No. 86-KP.*

D X N TRADE MARK

*Established 1827*

JOSEPH DIXON CRUCIBLE CO.
JERSEY CITY, N. J.

# *Pay for Themselves . . . In Four Miles of Road*




*Turn-O-Matic Cement Boxes in Use on Perry Highway, a Penna. Highway Project. Holmes Const. Co. of Wooster, O., Contractors*

TURN-O-MATIC Cement Boxes have revolutionized cement handling! They are simple to operate, so inexpensive that they pay for themselves in four miles of road work.

Contractors using Turn-O-Matics have been able to take one or more trucks off their batching fleet. They eliminate men to handle sacks, reduce truck time and costs.

Equip your batch trucks with Turn-O-Matics. Fill them at the batching plant. Keep cement absolutely dry. Avoid all loss in transit—there's no cement lying on the aggregate to get wet or blow away.

At the mixer lift the box lid. Turn-O-Matic automatically turns over, spreads cement over the stream of aggregate. All your cement reaches the mixer at *full strength,* none of it sticks to truck body or skip.

Turn-O-Matics are easy to remove when not needed, are convenient, economical. Let us explain their operation in detail. Write.

# GEO. O. HARM CO.

*CEMENT HANDLING EQUIPMENT*

WARREN, OHIO

# Is The Weather Holding You Back?

NEITHER stormy weather nor bad going can hold you back if your dirt movers are Hughes-Keenan "Iron Mules." These 2 and 4-yard tractor dumps are the tug-boats among dirt movers. They'll go out and haul at a profit when it's impossible to even use trucks and teams.

Front wheel drive is the reason why hauling conditions that seriously handicap trucks and teams do not affect the profitable operation of Hughes-Keenan "Iron Mules." Even when conditions are ideal for other equipment, "Iron Mules" can haul more dirt per day at far lower operating cost. And recent improvements, such as spring mounting throughout, make these dirt movers more efficient than ever.

Mail coupon below for "Iron Mule" folder: *You'll Never Be in the Red with "Iron Mules."*

**HUGHES-KEENAN GLIDER DUMPS**

MOST every dump truck user knows that Hughes-Keenan Dump Bodies are unusual value. Stouter in construction, more efficient in design, with dumping mechanism that can be treated rough without fear of breakdown.

Hughes-Keenan Gravity, Hand and Power Glider Dumps are well worth inquiring about, especially the latter, which is a mechanical power hoist dump of unique design and remarkably low cost.

Mail the coupon for our new 1930 catalog.

THE HUGHES-KEENAN COMPANY
MANSFIELD, OHIO

**HUGHES-KEENAN**
**IRON MULE**
**TRACTOR DUMP**
MOUNTED ON MODERN TRACTORS

*TEAR OUT—MAIL NOW*

HUGHES-KEENAN COMPANY, Mansfield, Ohio.

Gentlemen:

Please send me without obligation your free illustrated "Iron Mule" folder and dump body literature.

Name .....

Address .....

City ..... State.....

# *On the Job—* Big or Small

Small jobs as well as big call for speed. And so, whether the job is a two-car garage or a mighty bridge span, you'll find Lowell Reversible Ratchet Wrenches taking part.

The quick, steady *pump*—back and forth, back and forth—without pause for re-fit saves carpenters and steam-fitters so much time that their Lowell Wrenches go with them on every job.

*Catalog "R" tells much more about these wrenches and their uses. Write for it.*

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**LOWELL**
REVERSIBLE
RATCHET
**WRENCHES**

# BUILT FOR WORK!

*—the WEHR Model U4, equipped with Wehr All-Purpose Wheels is the ideal construction and maintenance unit*

Ever since their introduction to the field, Wehr Power Graders have been unquestioned leaders in their ability to perform. This has always been due to advanced engineering ideas and good, honest construction.

The Wehr Model U4 is undoubtedly the most efficient construction and maintenance unit ever built. It has ample strength for the most severe service. It embodies the time-tried Wehr engineering ideas. It possesses the utmost utility for construction and maintenance work, particularly when equipped with Wehr All-Purpose Wheels, which provide sure-footed traction under every conceivable condition.

There is no better unit built for highway work, and there is no more profitable unit that a road equipment distributor can handle.

It will pay contractors, township, county and state highway officials to consider the Wehr line of road equipment before making any decision. Complete data will be furnished upon request.

**WEHR COMPANY, Milwaukee, Wis.**

*Factory*—Cudahy, Wis.

# WEHR
## ROAD EQUIPMENT

When the Job is
TOUGH
you can rely on the
**"GROUNDHOG"**
**Revolving Tractor Scraper**

Road Grading—Municipal Air Port Construction—Golf Course Building—Real Estate Developments—Excavating Work—Parks—Fills—and General Leveling Operations.

Works fast—the depth of cut is always under control—loads and spreads—or dumps, under forward dra[illegible]ment for the busy contra[illegible]

THE RODERICK LE[illegible]
Dept. CM, Mansfi[illegible]

| No. | | Capacity |
|---|---|---|
| 4A | [illegible] ft. | 3/5 yd. |
| 5A | 5 ft. | ¾ yd. |
| 5B | 5 ft. | 1 yd. |

BUILT TO STAND
THE GAFF

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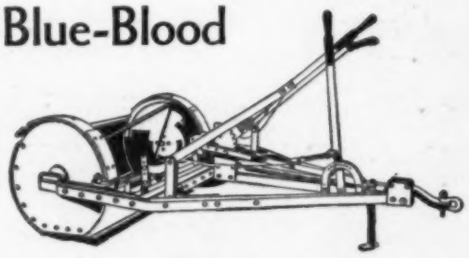
A
Blue-Blood



WIARD
Revolving Automatic Scraper

Made by the oldest plow maker in America, this scraper is a true blue-blood in speed, in stamina and strength. A "3 in 1" machine that excavates, scrapes and grades — all under the quick control of one man. It handles such a great variety of jobs that it's always busy—and always a profitable addition to the contractor's equipment—write for it.

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Batavia, N. Y.

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*Where you move or*
*How you move*

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I have moved FROM

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Company Employed by or Business Connection .....
Nature of Business ..... Title .....

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And then, no matter where you move to all that *Construction Methods* needs is your old and new address.

If you have a new job in view, fill in the coupon and *Construction Methods* will be there to aid you with timely tips and helpful hints. Whenever you move be sure to

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# PERFECTLY CURED CONCRETE

THE ideal way to cure concrete pavements is the use of Calcium Chloride. Used as an admixture or spread on the surface this easy-to-handle, flaky material produces concrete which is outstanding for its density and smoothness as well as its strength in resisting wear.

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You owe it to yourself to get the full facts about these up-to-the-minute curing methods. Write today to any of the three companies listed on this page and ask for booklet 242.

CALCIUM CHLORIDE PUBLICITY COMMITTEE

THE COLUMBIA PRODUCTS COMPANY
Barberton, Ohio

THE DOW CHEMICAL COMPANY
Midland, Michigan

SOLVAY SALES CORPORATION
40 Rector Street, New York

# CALCIUM CHLORIDE

# BIG as a man's BODY

It takes POWER to break chunks as big as a man's body out of *reinforced* concrete. That's what this Cleveland C7 is doing in tearing down this railroad bridge. Consequently—

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Cleveland Steels are made by our own method which retains the proper flow lines in the fibres of the steel near the collar. Common steels are frequently distorted at this point—break under strain.

Cleveland "Clevaloy" Chisels and moils will last at least twice as long as ordinary steels under more severe service. Order some Cleveland Steels for trial. You'll be surprised at their durability and low cost performance.

**CLEVALOY CHISELS**

are regularly made 1¼ in. and 2½ in. wide, 14 in., 18 in. and 24 in. long under the collar. The moil can be had in the same lengths. They're stamped *CRD* on the collar.

The Cleveland Rock Drill Co.
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**CLEVELAND ROCK DRILLS**

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*Announcing the New*

## "FLOR-OX" 15-25
### CONTRACTORS' HOIST

This NEW "FLOR-OX" is marked by smoothness of operation, utmost dependability and extreme ruggedness of construction. It has the same outstanding features as the "FLOR-OX" 35-50.

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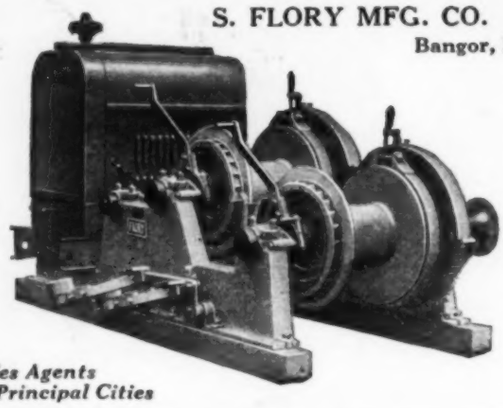

*Sales Agents in Principal Cities*

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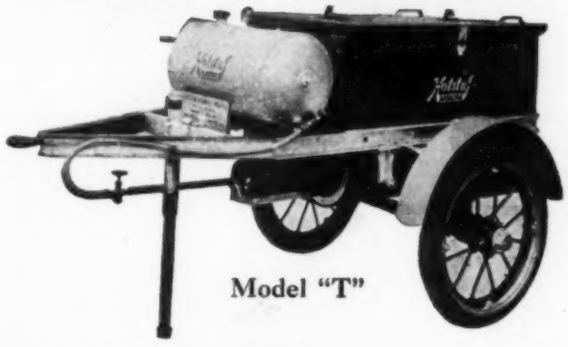
Toledo, Ohio

# Hotstuf

TRADE MARK REG

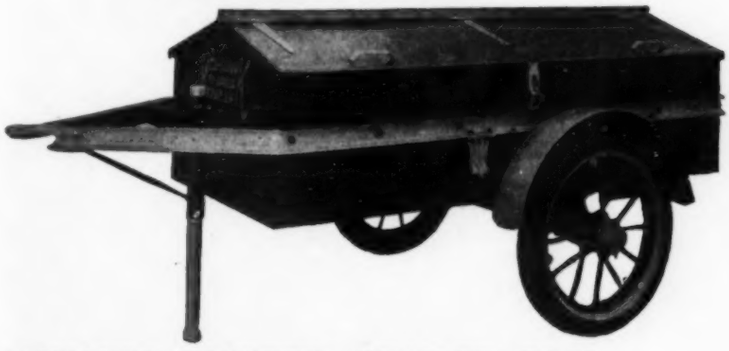
## ASPHALT HEATER



Model "T"

"HOTSTUF" Asphalt Heater, with the patented elevated melting chamber is sold on its greater melting capacity rather than storage capacity. Made in capacities best suited for the Highway Contractor, City, County and State Highway Departments. Equipped with the MOHAWK torch having the patented removable coil feature.

### HI-SPEED TRAILER

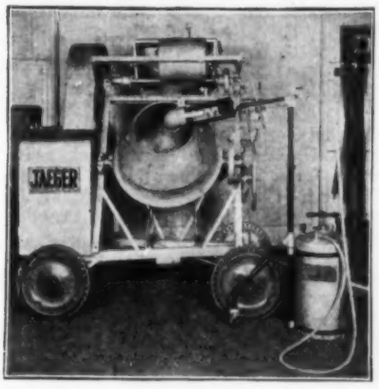


MOHAWK HI-SPEED TRAILER TOOL BOX. No more loss of tools by theft. Take them to the job, keep them there till the job is finished. Lock them up at night in a MOHAWK HI-SPEED TRAILER TOOL BOX, which is designed to fit the requirements of the up-to-date road contractor.

**GET OUR BULLETINS SHOWING COMPLETE LINE OF HEATERS—TRAILERS and WINTER EQUIPMENT**

## UNIVERSAL CONCRETE HEATERS

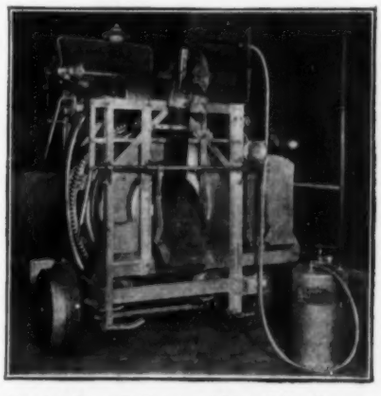
**For all types of Tilting and Non-Tilting Drum Mixers**




Model S—90 Degree Heat Distributor Applied to Tilting Type Mixer

All Hotstuf Universal Oil Burning Concrete Heaters have the patented removable coil and non-clogging vaporizing tip features, and will give a flame temperature of from 1800 to 2000 degrees F. The burner is detachable and can be used as a heating or thawing torch.

**Made in two convenient sizes.**



Model B—45 Degree Heat Distributor Applied to Non-Tilting Mixer

## MOHAWK ASPHALT HEATER COMPANY

**Schenectady** *Distributors in Principal Cities* **New York**

Baker Hydraulic Bulldozer

Baker Maney Self-loading Scrapers

Baker One-man Automatic Rotary Scrapers

# BAKER

## TRACTOR EQUIPMENT

**BAKER BULLDOZERS**

Hydraulic Bulldozers with high lift and ability to work below track are made for both Caterpillar and Monarch Tractors. There are also hand-operated Baker Bulldozers and Backfiller for light tractors.

**BAKER MANEY SCRAPERS**

The original self-loading scrapers made in three sizes—¾, 1 and 1½ cu. yds. They dig, load, haul, dump, spread and compact the dirt. Used in trains behind large tractors.

**BAKER ROTARY SCRAPERS**

One-man automatic Scrapers in four sizes for use with any tractor. No stopping or backing up. Automatic draft control—continuous operation. ideal for short-haul work.

*Ask for Special Bulletins*—Baker Bulldozers ☐ Baker Maney Scrapers ☐ Baker Rotary Scrapers ☐

THE BAKER MANUFACTURING CO., 568 Stanford Ave., Springfield, Ill.

## *Announcing the WAPPAT Red Streak Grinder*

A grinder designed and built with plenty of power to do general grinding and tool sharpening. One that has adjustable safety guards that make grinding possible at any position on the circumference of wheels. It's easy to move any place for convenience. Carry it wherever the job is.

Because of exceptional balance, vibration is almost entirely eliminated.

SPECIFICATIONS

Size of wheels: 6-in. diameter by ½-in face by ½-in. hole.
Net weight, 36 lbs.
Motor: 110 volts or 220 volts—A.C. or D.C.
Equipment: Switch located in base, heavy rubber-covered cable with attachment plug. Two adjustable tool rests. Two adjustable wheel guards.

**WAPPAT INCORPORATED**

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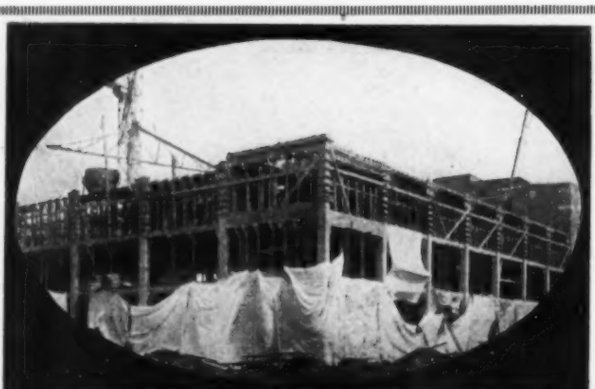

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Protection against weather-damage at low cost. "FULTEX" Khaki Waterproofed tents. tarpaulins and windbreaks—serviceable for every purpose—quality at moderate price. Burlap—in bale or made-up covers—for protecting green concrete.

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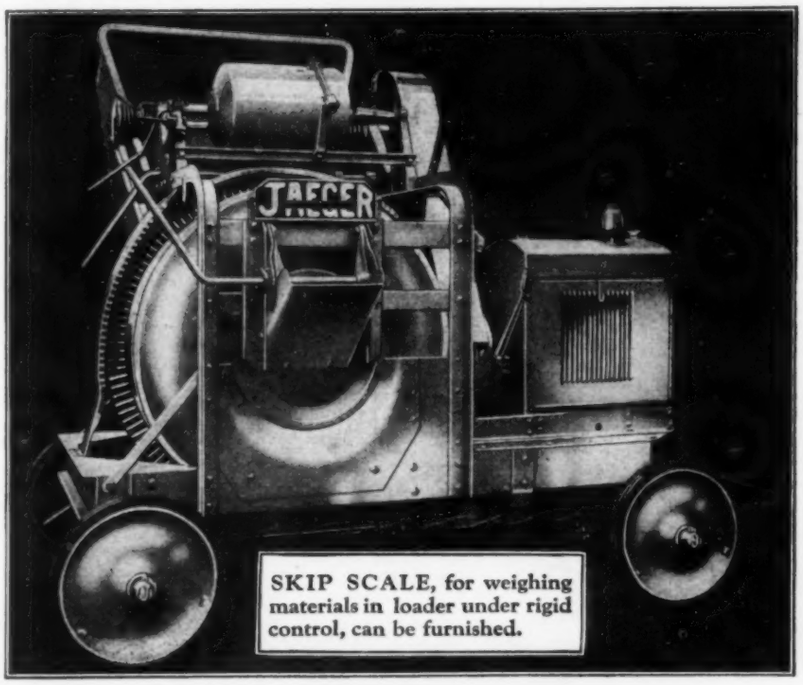
# 1 and 2 Bag Mixers

## .... Again Stepped Up in the Features that mean SPEED and EASY HANDLING ... to Make You Money on 1930's Jobs!




SKIP SCALE, for weighing materials in loader under rigid control, can be furnished.

## 10S Handles like a 7...

50% extra strength...1000 lbs. less weight...all-steel,

Short coupled, direct driven, 100% ball bearing,

Dual tire wheels, roller bearings, springs,

Patented Skip Shaker loading, faster discharge, rigid water control with fast tilt and pour tank,

One man end control.

## 7S *SPEED KING* Handles like Any TRAILER....

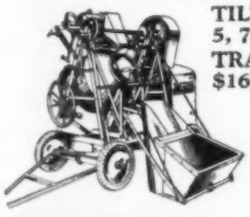
*Outsells all other One Bag Mixers!*

STOUTER, faster than ever, this sensational mixer is ready to hang up new 1930 records. Finest construction with all Jaeger features (Skip Shaker, Accurate Water Tank, ball bearings, one man control) plus advantage of end discharge and many new improvements.

Contractors have proved it out...buy more Speed Kings than any other 7S mixer built.

DUAL TIRES—SPRINGS
ROLLER BEARINGS
TRAILS ANYWHERE

OTHER NON-TILTS 14, 21, 28, 56S.
TILTERS 3½, 5, 7, 10S.
TRAILERS $169 up.

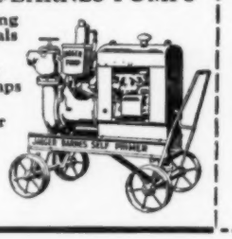


JAEGER-BARNES PUMPS

Self-Priming Centrifugals

Triplex Road Pumps

All other types



**JAEGER MIXERS...PUMPS ...HOISTS...*Information Slip***

THE JAEGER MACHINE CO.,
800 Dublin Ave., Columbus, Ohio

Send catalog, prices and complete data on 1930—

[ ] Jaeger Tilters [ ] Non-Tilts [ ] Pumps
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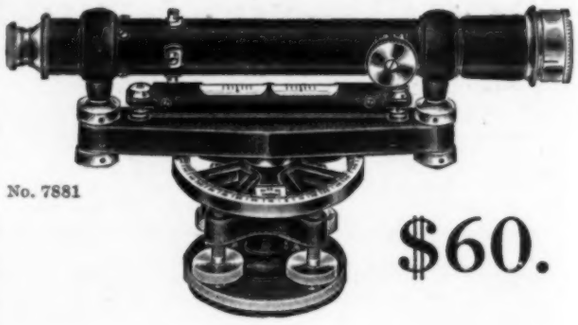

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THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full ¾ circle swing, 1/3 yard dipper capacity, 16½ foot radius, gasoline power.

With Trench Hoe attachment for ditching or Boom Extension for clamshell, dragline or crane, the Fundom is an unbeatable three-in-one digging machine.

*Get the details and name of nearest dealer. Address—*

**The Fundom Hoist & Shovel Co.**
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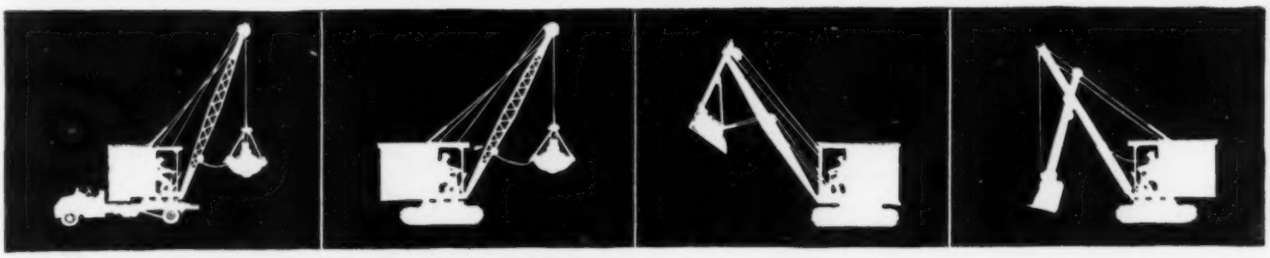

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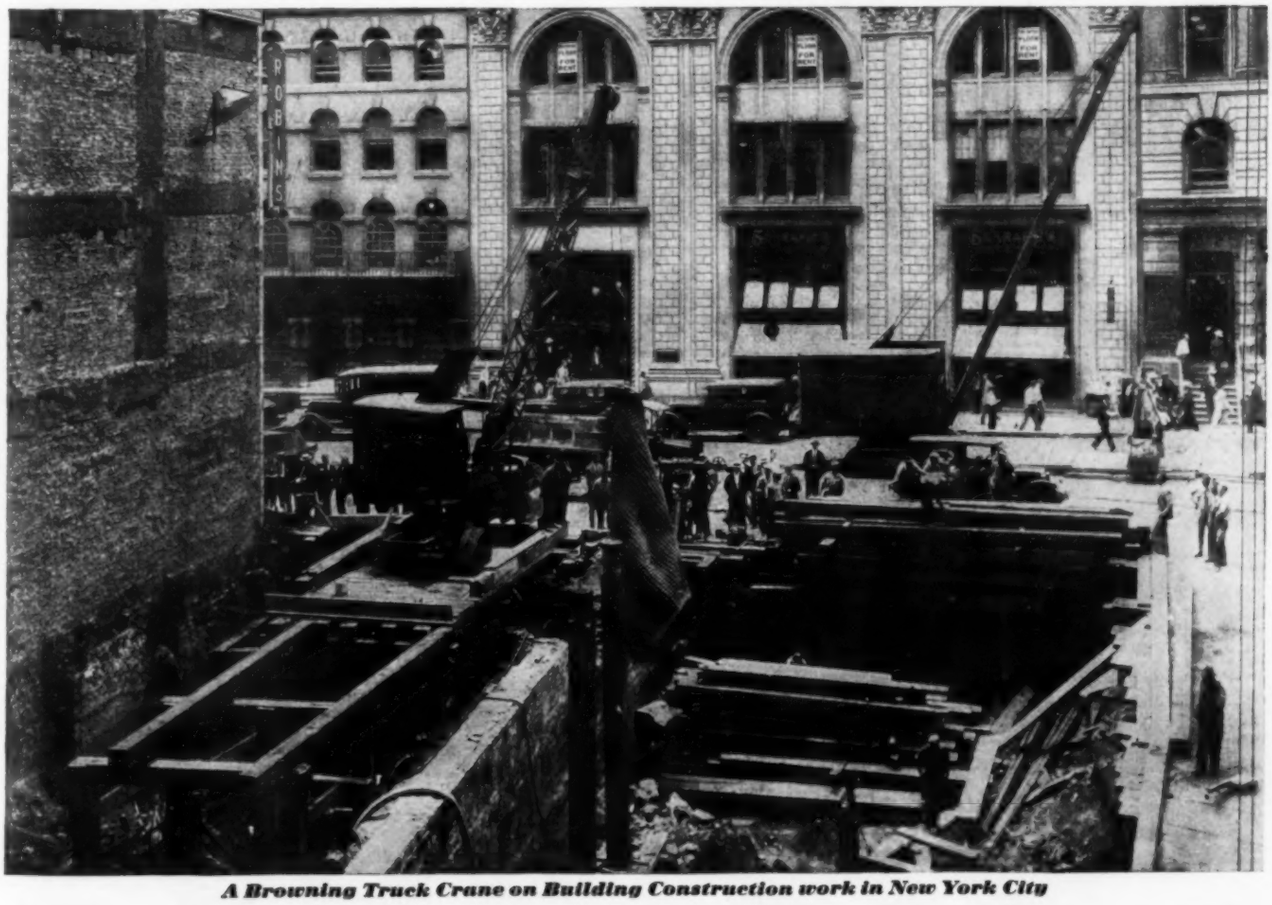


***A Browning Truck Crane on Building Construction work in New York City***

# BROWNING

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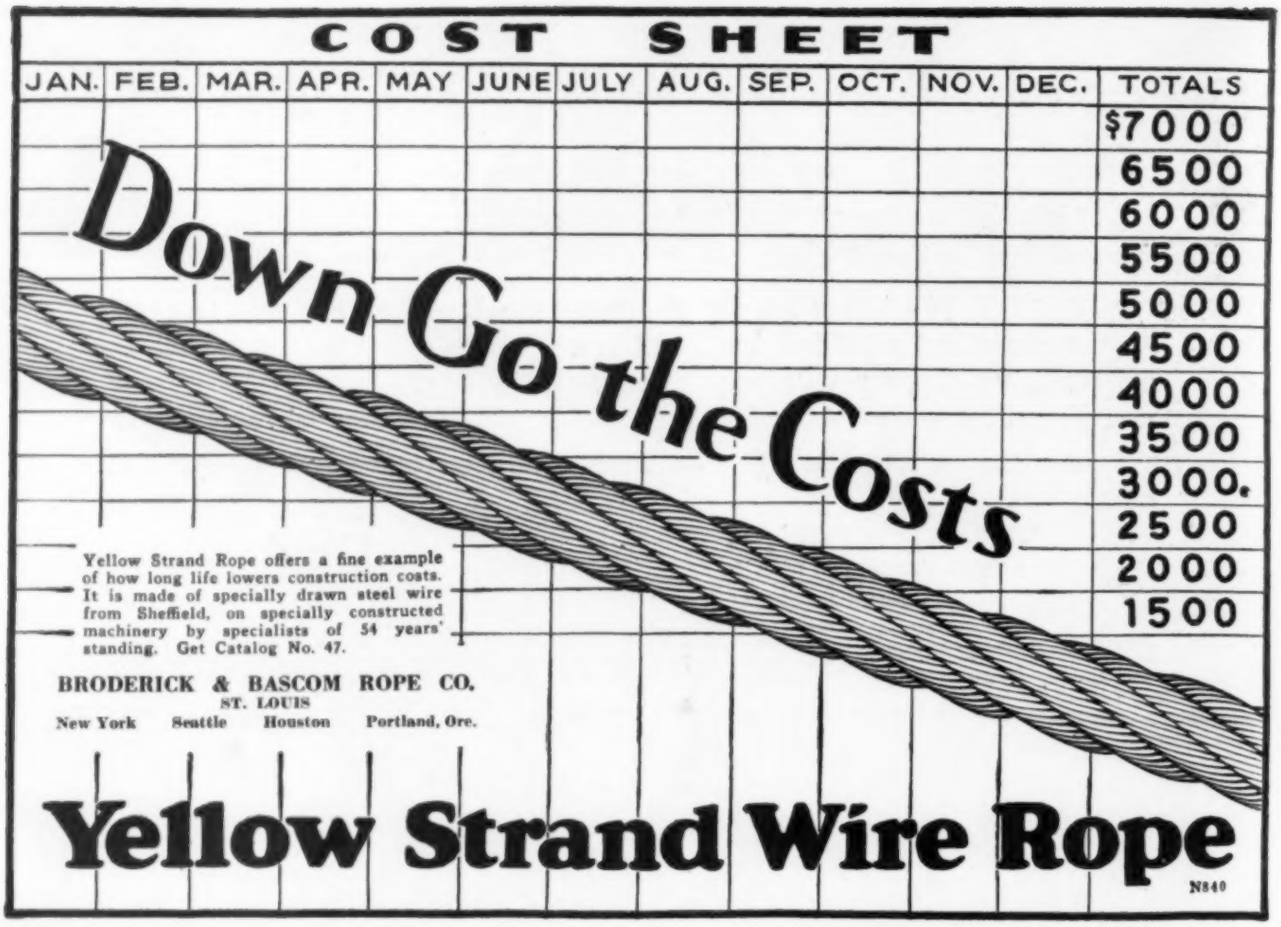
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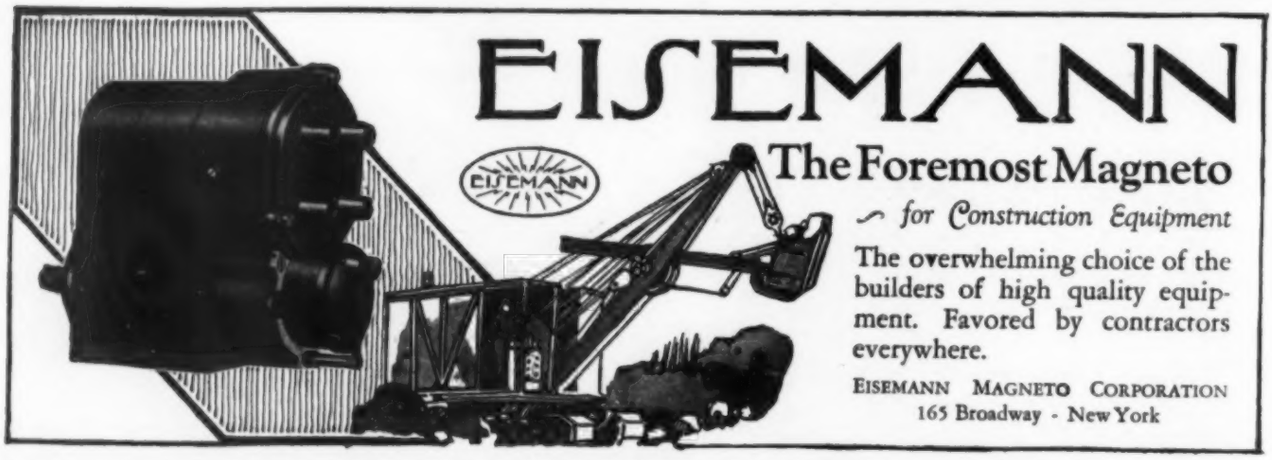
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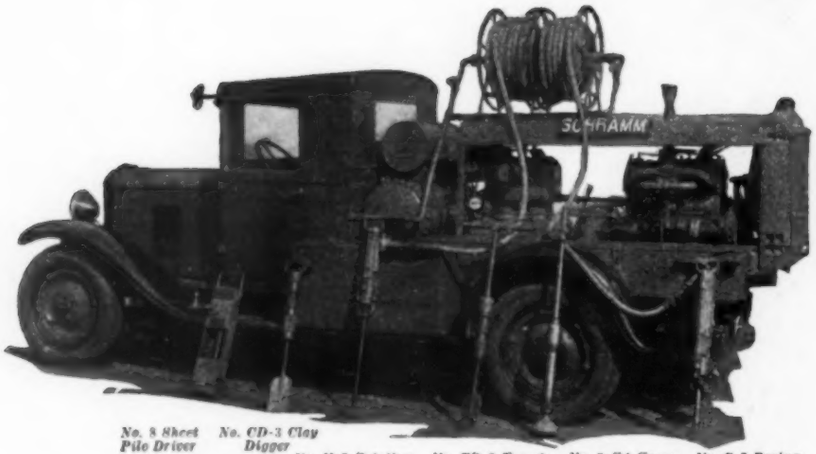
CHAS. C. KERNER, 152 Chambers Street, New York, Exclusive Foreign Representative




No. 8 Sheet Pile Driver | No. CD-3 Clay Digger | No. H-7 Rotating Rock Drill | No. TD-3 Trench Digger | No. 5-FA Tamping Tool | No. C-7 Paving Breaker

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Pictured is a SCHRAMM No. 120 Compressor, mounted on 1½ ton truck, with hose reel, and extra tool boxes.

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## Schramm Inc., Manufacturers

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A high grade electric steel casting with a tensile strength of 80,000 lbs. and GUARANTEED to do its work up to this capacity! All parts carefully machined and fitted. One look at the general construction tells the story of strength and long life! This is just one of the many famous Oswego Tools, fully described in the Catalog which will be sent you upon receipt of coupon.

Yes, you may quote me on this Steel Screw Punch and send me the Catalog of Oswego Punches, Vises, Wrenches, Pipe Cutters, etc.

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Since 1887

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*for quick manipulation of sewer and waterworks castings, pipe, timber, . . . etc.*

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Your work of handling bulky pipe, timbers, etc.—is quickly done when you use Dobbie equipment and speed in operation means greater profits.

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*Write for prices, Dobbie all-steel Derricks and Rotating Derricks*

FOR SUCCESSFUL PERFORMANCE · A.G.C.-A.

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I don't want to brag, but I have poured concrete. I have made records and busted them.

But records don't just happen. Good concrete jobs are not accidents. I never take chances. Everything has to be right before I start.

I want good men, good material and good equipment. And the most important part of the equipment is the hoist and that has to be a Thomas. I want a band friction rig.

With a Thomas you can forget about trouble. The frictions are the most important part of a hoist.

With a Thomas everything is where you can get at it. Never had to take a drum out of one yet.

There's trouble enough on a big concrete job without having to nurse along a sick hoist. Give me a Thomas every time.

# THOMAS ELEVATOR COMPANY

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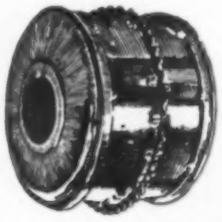
## Drum Tracks

Ever have a job held up, wating for a mixer drum to be replaced? The lost time is far more valuable than the cost of the drum.

When you buy a Knickerbocker Mixer you buy drum insurance.



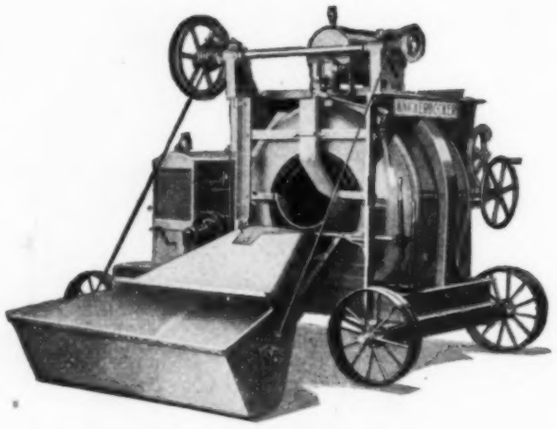
A Knickerbocker drum has a long life because it has a drum track construction that will stand the hard punishment it gets.

On the steel shell are removable cast semi-steel tracks. In our shops the drum, with the tracks in position, is placed upon a vertical mill where at one setting the wearing surfaces are turned to true circles in perfect alignment, thus assuring a smooth running drum. This construction makes field replacement of tracks simple and low in cost, if ever necessary.

Furthermore, the flanges are on the drum tracks, not on the trunnion rollers. This more extended bearing area distributes wear. No flange has ever worn or broken from a Knickerbocker Mixer.

This drum track construction adds weight to the machine—valuable, usable weight. It adds to manufacturing cost. And it adds immeasurably to the life of the drum—it may save the owner five times its cost.

*These and other advantages are explained in detail in our catalog—ask for a copy.*



**THE KNICKERBOCKER COMPANY**
***Jackson, Michigan***

302

# HUMDINGER PUMPS

Non-clogging, everlasting rubber ball valves, totally enclosed, running-in-oil jacks, bronze bushed bearings, all steel trucks, and enclosed engine crank cases make HUMDINGER PUMPS.

## THE CONTRACTOR'S CHOICE

***Full detail description given in Bulletin No. 1034 CM. Send for a copy.***

**RALPH B. CARTER CO., 53 Park Place, New York**
**Factory: Hackensack, N. J.**

# *Sore, Cold Hands Can't Do Their Share*

**Sabin Co., Gloves.**
**536-40 W. Federal St.,**
**Youngstown, Ohio**

Send me information on Sabin Gloves.

Name .....

Address .....

.....

If you wish a pair of No. 259 Gloves, enclose $1.60 and check here ( ).

A pair of hands in a pair of Sabin's No. 259 Gloves are warm and protected.

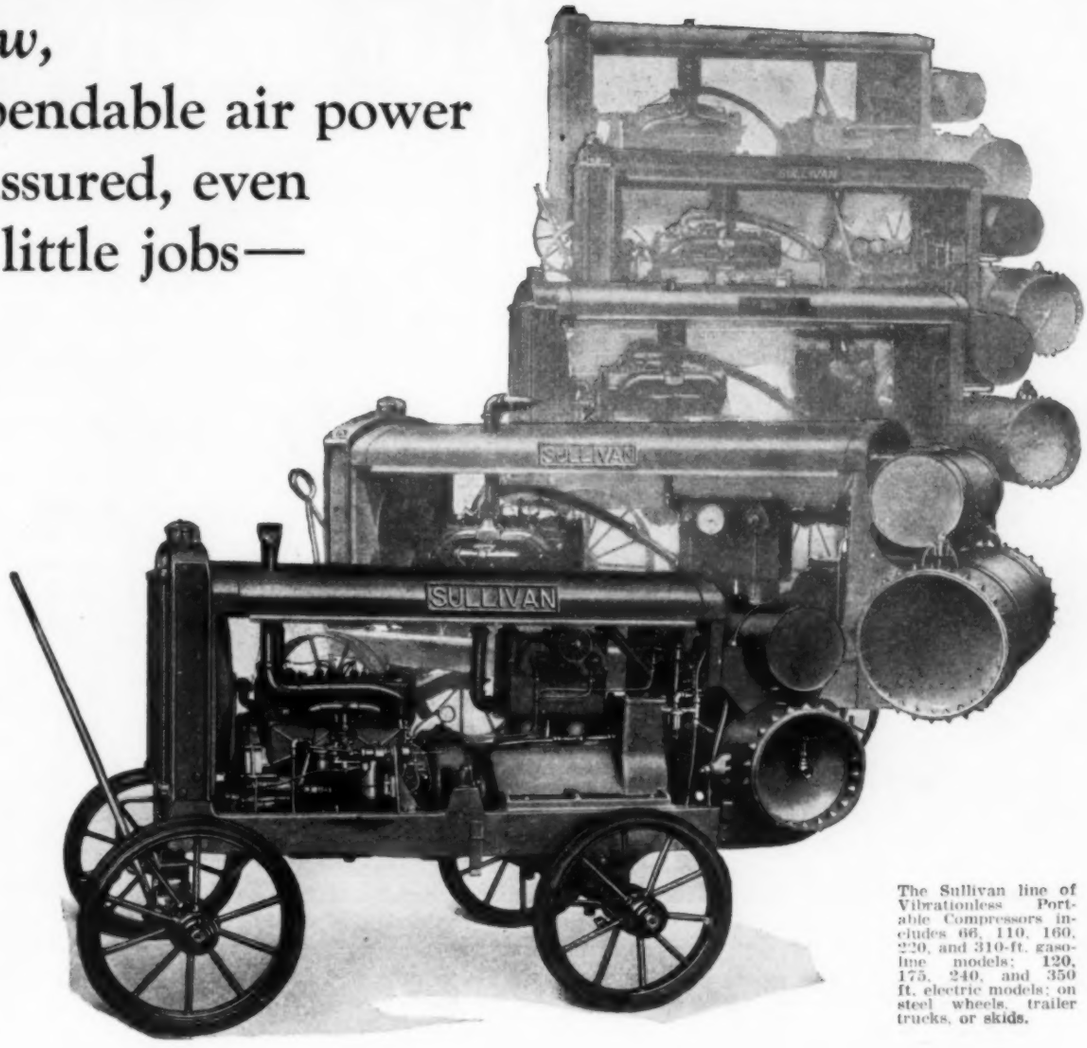
They'll do more work than bare hands—they're more profitable.

Contractors and foremen are telling their men about Sabin's gloves. They're real gloves—warm and well made. Buffed elkhide, hand and back. Grease and water won't hurt them—washable—have six inch canvas cuff and hold tight back.

**Send the Coupon. Be sure to mention size wanted.**

**SABIN CO.—*Gloves***
**536-40 W. Federal St.**
**Youngstown, Ohio**

# *Now,* dependable air power is assured, even on little jobs—




The Sullivan line of Vibrationless Portable Compressors includes 66, 110, 160, 220, and 310-ft. gasoline models; 120, 175, 240, and 350 ft. electric models; on steel wheels, trailer trucks, or skids.

# —Sullivan adds the 66 ft. Vibrationless Compressor

Vibrationless Portable Compressors have given a new meaning to dependable air power service.

So popular have these Vibrationless Compressors become, that Sullivan Engineers have now added the 66-foot size to the Sullivan line.

You will find this new compressor a real profit maker on small jobs of rock drilling, spray painting, concrete or asphalt cutting, clay digging, tamping, riveting, caulking, cleaning—wherever a small amount of work is to be done with air, or where tools will be run intermittently.

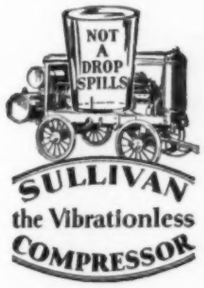
**Details of the new Vibrationless Compressor**

The 66-foot "WK-312" has two cylinders 4¼x4 inches—is run by an 18 H.P. engine, and is good for 100 lbs. pressure.

It may be mounted on steel wheels (wt. 2500 lbs.) spring mounting with rubber tires; skids or two-wheel trailer.

Standard Sullivan Equipment includes: American Bosch high tension magneto and impulse starter, Zenith Carburetor, Pierce governor, Sullivan slow-down governor, pilot valve unloader, Imperial engine primer and AC Filters.

*Vibrationless Compressor Catalog, No. 483-F.*




## SULLIVAN AIR POWER EQUIPMENT

Rock Drills, Concrete Breakers, Clay Spaders, Drill Sharpeners, Portable Hoists, Air Compressors.

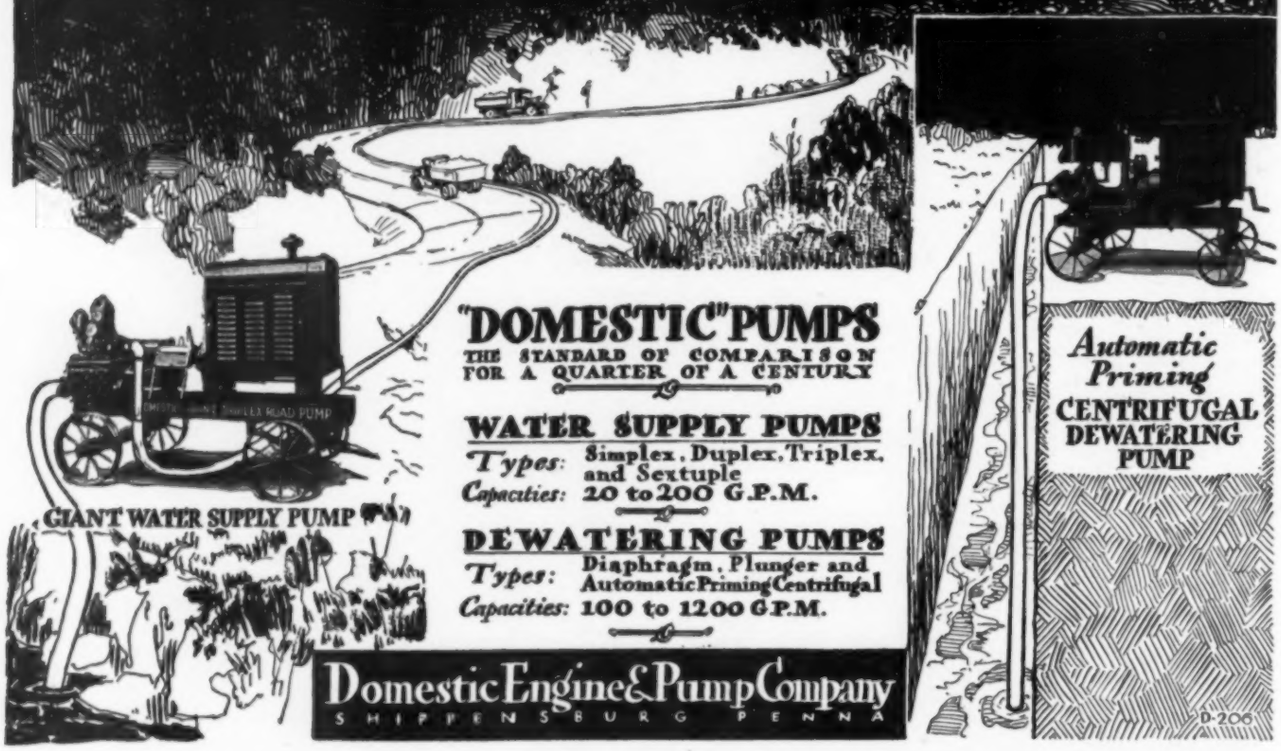
SULLIVAN MACHINERY COMPANY

*Offices in all principal cities of the world*

816 WRIGLEY BLDG., CHICAGO

# "DOMESTIC" PUMPS *for* CONTRACTORS

*Their Use Means* SAFETY SPEED *and* PROFITS


GIANT WATER SUPPLY PUMP
"DOMESTIC" PUMPS
THE STANDARD OF COMPARISON FOR A QUARTER OF A CENTURY
WATER SUPPLY PUMPS
Types: Simplex, Duplex, Triplex, and Sextuple
Capacities: 20 to 200 G.P.M.
DEWATERING PUMPS
Types: Diaphragm, Plunger and Automatic Priming Centrifugal
Capacities: 100 to 1200 G.P.M.
Automatic Priming CENTRIFUGAL DEWATERING PUMP
D-206

Domestic Engine & Pump Company
SHIPPENSBURG PENNA

# ATLAS DOUBLE-DUTY MACHINE

## Does Work of Grader and Scraper in One Operation

*Be low bidder and make larger profits*

THE patented Grader-Scraper is a double-duty machine. At little more cost than a scraper, it accomplishes the work of two machines—a grader and a scraper—by application of the plow.

PLOWS BREAK SOIL—Plows control the cut and aid the Grader-Scraper to work efficiently in difficult soils, so a scarifier is seldom needed.

A PROFIT-MAKER—The Grader-Scraper grades, scrapes, fills and moves dirt at a low cost heretofore considered impossible.

Send for Bulletin No. 8, illustrating the Grader-Scraper, giving capacity, specifications and showing character of work it does.

**Bulletin No. 9 tells why the Atlas Rotary Wheel Scraper moves dirt at exceedingly low yardage cost.**

**ATLAS SCRAPER COMPANY**
6207 Maywood Ave., Bell, California

60 ton Hydraulic Pipe Bender

# DO YOU BEND MUCH PIPE?

## If you do you need a Watson-Stillman Hydraulic Pipe Bender

These machines are not only rapid and economical of labor, but the bends are made uniform and without danger of buckling or crushing.

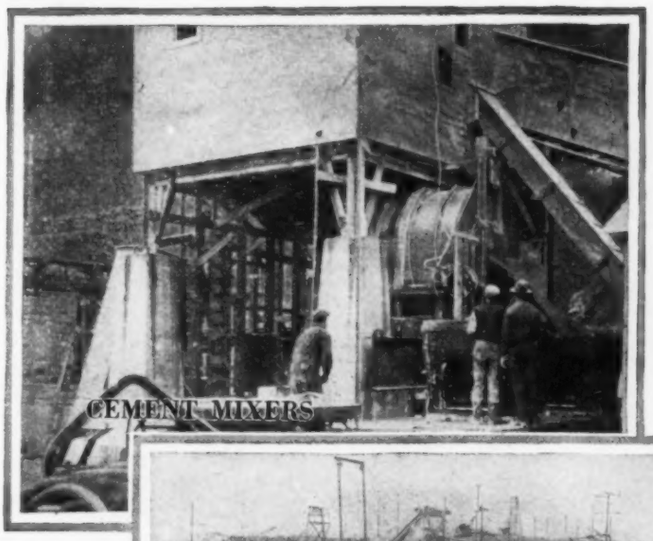
We build pipe benders in a variety of types and sizes as well as a full line of Hydraulic Machinery including jacks, pumps, accumulators, presses, shears, etc.

*Write for catalogs.*

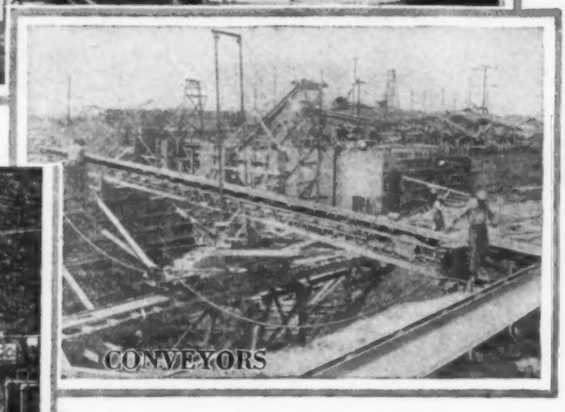
THE WATSON-STILLMAN CO.
1014 Evening Post Bldg., New York City

Chicago, 228 N. LaSalle St.
Cleveland, Penton Bldg.
Pittsburgh Union Trust Co. Bldg.
Philadelphia, Widener Bldg.
Detroit, 2970 W. Grand Blvd.
St. Louis, 705 Olive St.

# *Contractors Prefer Electric Equipment*


CEMENT MIXERS

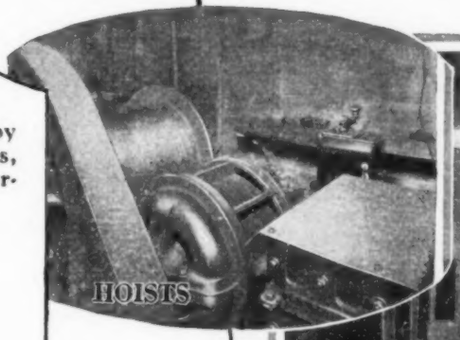
DERRICKS

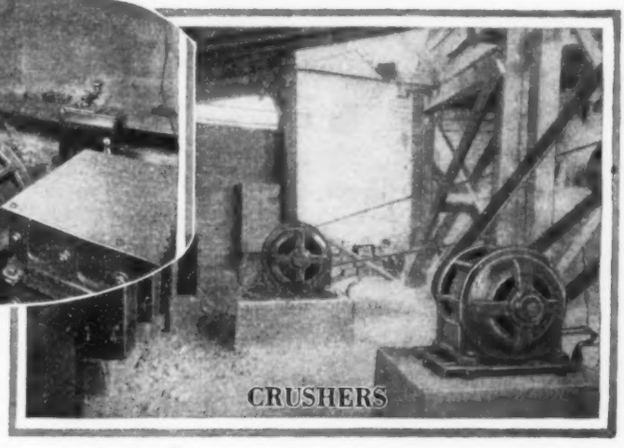

CONVEYORS

COMPRESSORS

These reasons were given by representative contractors, queried in a nation-wide survey:

- Economy
- Few repairs
- Low upkeep
- High salvage value
- Dependability
- Best for cold-weather work
- Breakdowns minimized
- No smoke or soot
- No handling of fuel or ashes
- Reduced fire hazard
- Convenience
- Ease of handling and operating
- Compactness
- Flexibility
- Noiseless
- No water lines


HOISTS


CRUSHERS

THERE is a G-E motor and control suited to every power requirement in the building construction field. Write, or call, the nearest G-E office for information on G-E Motorized Power.

## *Motorized Power*
### *–fitted to every need*

200-339

# GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SALES AND SERVICE IN PRINCIPAL CITIES

# Why DOES THE Thor "6" AIR COMPRESSOR HAVE A SUPER-CHARGER

The THOR "6" Air Compressor has a Super-Charger for only one reason—so that it will actually deliver more air than any other compressor of the same size or rating.

This Super-Charger feature is not just "sales-talk". It means more air delivery for your money which is what you want in a compressor. It means that you can buy a THOR Compressor rated at 250 cu.ft. instead of the usual 310 cu.ft. machine and operate just as many tools; or you can buy a THOR Compressor rated at 116 cu.ft. instead of a 160 cu.ft. size and accomplish the same results. And this means quite a saving of money to you which is an important consideration.

The Rix Super-Charger is an exclusive, patented feature of the THOR that enables the piston on its idle or downward stroke to compress the additional air the THOR delivers. And the Super-Charger adds no complications. It is simple, fool-proof and efficient.

*Before buying your next compressor, investigate the THOR. Find out why you can get more air for your money. You'll find it well worth while. Complete information is yours for the asking.*

**INDEPENDENT PNEUMATIC TOOL CO.**

PNEUMATIC TOOLS — GENERAL OFFICES 246 So. Jefferson St. Chicago — ELECTRIC TOOLS

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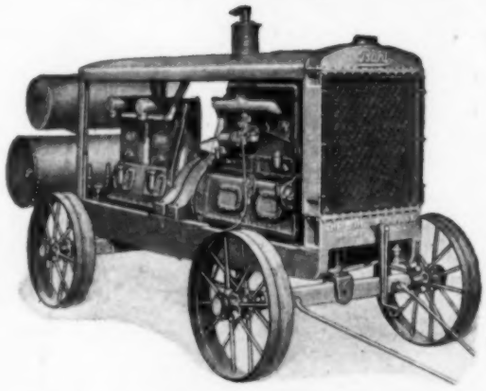
## UNFAILING SERVICE LONG LIFE



## *Buhl* COMPRESSORS

Over a period of many years **Buhl Portable Compressors** have established an enviable record for unfailing service and long life under the most severe working conditions.

Combined with their unusual reliability the user secures a machine equipped with the most modern improvements giving exceptional economy in operation.

**Buhl** Portable Compressors are obtainable in **36, 55, 90, 100, 110, 220** and **330** cubic feet capacities with any mounting desired.

***Descriptive Bulletin on Request***

The *Buhl* Company

Old Colony Building, CHICAGO

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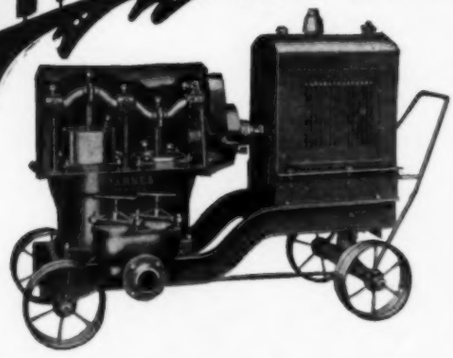
## GETS RID OF THE WATER



Capacities up to 15,000 gallons per hour—maximum suction lift 25 feet—maximum total head, lift and force, 75 feet. Get the facts on drainage pumps from

**THE BARNES MANUFACTURING CO.,**
**Mansfield, Ohio, U. S. A.**

**BARNES**
**PLUNGER TRENCH**
**PUMPS**

PERFORMANCE—
PROFITS—

# THE 1930 MULTI FOOTE PAVER

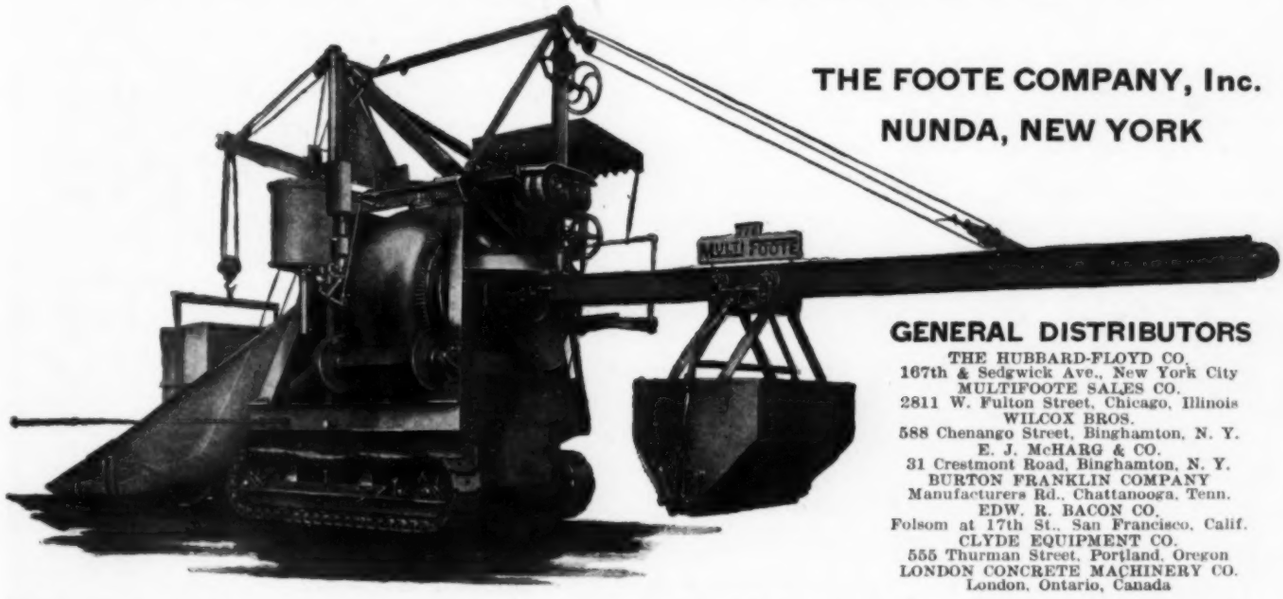
GREATER SPEED—
GREATER RELIABILITY—
FAST, STEEP DISCHARGE—
TRIED, PROVEN, DEPENDABLE

*for Speed-Service-Success*

**A Paver refined to the last degree and backed by twenty-five years experience in building Road Pavers. The Best Standard Equipment throughout.**

TIMKEN BEARINGS
HERCULES HEAVY DUTY GASOLINE MOTORS
NO-PRESSURE WATER TANK

**The Record of the Multi-Foote Paver for years assures you of that steady, daily performance which means Speed and Profits. The 1930 Improvements automatically save you every possible minute.**




**THE FOOTE COMPANY, Inc.**
**NUNDA, NEW YORK**

**GENERAL DISTRIBUTORS**

THE HUBBARD-FLOYD CO.
167th & Sedgwick Ave., New York City
MULTIFOOTE SALES CO.
2811 W. Fulton Street, Chicago, Illinois
WILCOX BROS.
588 Chenango Street, Binghamton, N. Y.
E. J. McHARG & CO.
31 Crestmont Road, Binghamton, N. Y.
BURTON FRANKLIN COMPANY
Manufacturers Rd., Chattanooga, Tenn.
EDW. R. BACON CO.
Folsom at 17th St., San Francisco, Calif.
CLYDE EQUIPMENT CO.
555 Thurman Street, Portland, Oregon
LONDON CONCRETE MACHINERY CO.
London, Ontario, Canada

*World's Largest Exclusive Builders of Road Pavers*

# WAR + + + ON THE RED

THE ONLY RED WORTHY OF THE FEAR of modern business is the baleful red that glows from figures written in scarlet ink, silently flashing the news of wastes that eat up profits, of excessive costs and inadequate returns. They are the figures of defeat. The world of business rightly hates these red figures. It wages against them a war without quarter, bitter and implacable.

In that war the business paper serves as artillery. Its guns are presses. Its projectiles are facts in their most potent form + + + for truth and printer's ink are a combination more devastating than TNT and steel.

In every field of industry or trade where there is a live business press a barrage of fact is being fired against wasteful practices. Production costs crumble daily under its drumfire of information on machines, materials, technique and management. Distribution costs are coming in for their share of pounding. The business paper as the attacking arm of business progress is out to do away with the things that eat up profits. The Reds must go.

Honestly, independently, the modern business press carries on its battle for better business practice. Its facts are accurate, tested, correlated and organized. They are unbiased. There is no special pleading, no "blurb," no catering to vanities. It has won the respect of its readers by its self-respect. By its dependability it has won their dependence. It commands a paid circulation on its own merits. It enjoys a sound advertising revenue because its character constitutes it a sound advertising medium.

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

## THE ASSOCIATED BUSINESS PAPERS, INC.

FIFTY-TWO VANDERBILT AVENUE - NEW YORK CITY

+ + + + +

*This publication is a member of the Associated Business Papers, Inc. . . a cooperative, non-profit organization of leading publications in the industrial, professional and merchandising fields, mutually pledged to uphold the highest editorial, journalistic and advertising standards.*

# SEARCHLIGHT SECTION

## EMPLOYMENT—BUSINESS OPPORTUNITIES—EQUIPMENT

**UNDISPLAYED—RATE PER WORD:**

*Positions Wanted*, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, 10 cents a word, minimum charge $2.00.

*Proposals*, 50 cents a line an insertion.

**INFORMATION:**

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

**DISPLAYED—RATE PER INCH:**

1 inch ..... $7.50
2 to 3 inches..... 7.25 an inch
4 to 7 inches..... 7.00 an inch

*An Advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

C.M.


STEEL SHEET PILING

Bought. Sold. Rented.

WEMLINGER INC.

Service, Technical advice, Stocks on hand everywhere.

149 BROADWAY NEW YORK


**New "SEARCHLIGHT" Advertisements**

must be received by noon, the 3rd of the month to appear in the issue out the 10th of the month.

*Address copy to the Searchlight Department*

**Construction Methods**

Tenth Ave. at 36th St., New York City

### POSITION VACANT

SUPERINTENDENTS of construction, engaged entirely in heavy construction work, experienced in hydro-electric construction, concrete and earth dams, power houses, rock excavations, etc. If you are open for a position of this description, advertise in the Searchlight Section of Construction Methods. Send your ad to the Searchlight Dept., Tenth Ave. at 36th St., New York.

### POSITION WANTED

CONSTRUCTION superintendent, with 14 years' experience on commercial building and heavy constructions, desires to make change. Also 2 years' experience on river bridges and power plants. First-class concrete engineer. References. PW-94, Construction Methods, Tenth Ave. at 36th St., New York.


STEEL SHEET PILING

LINDHEIMER — SUCCESSFUL PERFORMANCE — SERVICE

Saves you money and trouble in Foundation, Cofferdam, and Sewer work.

Bought-Sold-Rented—Always carried in stock

*LONG DISTANCE TELEPHONE: CENTRAL 0491*

S·W·LINDHEIMER, Inc

31 South Clarke St. CHICAGO


### FREE BULLETIN

EQUIPMENT Corporation of America, 1150 South Washtenaw Avenue, Chicago, Ill. 47-Page Stock List No. 128 of rebuilt equipment for contractors, quarries, gravel plants, material yards and industrial concerns, including the equipment used on the Starved Rock Dam which was recently purchased from the contractor.


USED EQUIPMENT BARGAINS

MIXERS

1—7L Jaeger with Loader, Le Roi Engine.
1—7L Jaeger with Loader, electric motor.
1—3½L Jaeger with Loader, gasoline engine like new.
1—4L Jaeger with Loader, gasoline engine.
1—2-bag JAEGER PLACING PLANT, practically new. Write to

JOHN F. STEINER
1220 Sassafras St., Erie, Penna.


## Employment "Opportunities"

JOBS and MEN—For Plant and Office: Technical, Executive, Operative and Selling: *See "SEARCHLIGHT"*

## Equipment "Opportunities"

TO BUY, SELL, RENT and EXCHANGE—Used and Surplus New Equipment and Material—*See "SEARCHLIGHT"*

## Business "Opportunities"

OFFERED and WANTED—Contracts, Capital, Plants, Properties, Franchises, Auctions—*See "SEARCHLIGHT"*

*Address SEARCHLIGHT DEPT., Tenth Ave. at 36th St., New York*

GN-030

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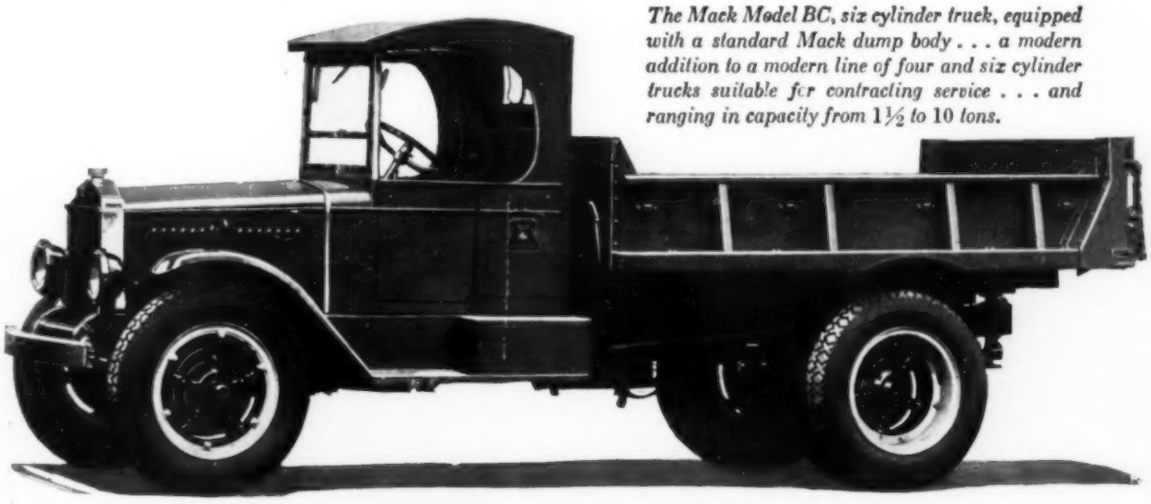
# HIGH-SAFE-SPEED and traditional MACK PERFORMANCE

From the super-duty Model AP—a six cylinder, six wheel Mack, built to carry 10 ton loads at 30 m. p. h.—down to the Model BG—a fast light-capacity six—Mack now has a complete line of four and six cylinder trucks . . . each adaptable to a particular phase of dump truck service. Regardless of road or load conditions, there is now a Mack to meet the need.

Modern Macks are characterized by remarkable features of versatility . . . Power for the rough going . . . Speed on the open road . . . and agility in congested traffic.

In each Mack model, the dump truck operator is assured of flexible performance, plus traditional Mack quality . . . earning capacity . . . economy and long life.

Mack



*The Mack Model BC, six cylinder truck, equipped with a standard Mack dump body . . . a modern addition to a modern line of four and six cylinder trucks suitable for contracting service . . . and ranging in capacity from 1½ to 10 tons.*

MACK TRUCKS, INC.

25 Broadway New York, N. Y.

More than 100 Direct Mack Factory Branches operate under the titles of "MACK-INTERNATIONAL MOTOR TRUCK CORP.," "MACK MOTOR TRUCK CO.," or "MACK TRUCKS OF CANADA, LTD."

every day . . .

## 50,000 vehicles use this TEXACO ASPHALT pavement

Few pavements in this country—or anywhere else in the world—can boast a *daily* traffic of fifty thousand vehicles. The impact of fifty thousand vehicles day after day, and year after year, is the surest test of an asphalt's ruggedness and durability.

The TEXACO Sheet Asphalt pavement on the Dallas-Oak Cliff Viaduct, Texas, is one of the few pavements carrying this exceptional traffic every twenty-four hours. Although the pavement has been in service since 1922, there are no patches in it today.

***During the past quarter of a century, paving contractors have constructed TEXACO Asphalt streets in 1460 American cities and towns.***

# TEXACO ASPHALT

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Philadelphia
Richmond
Boston
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**The Texas Company**
**ASPHALT SALES DEPT.**
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